GEN

✓

ALLEN COUNTY PUBLIC LIBRARY
3 1833 01864 7302

GC
976.102
M76LI

The
LIGHTNING
Route

A Milestone in the March of Progress

The LIGHTNING *Route*

A Milestone in the March of Progress

1886—1936

Published by
ALABAMA POWER COMPANY
March, 1936

Alabama State Capitol Building as it Appeared a Few Years After the Inauguration of Regular Service Over the First Completely Electrified Street Railway System on the American Continent.

Foreword:

WHILE ordinarily the transition of an industry from one phase to another does not call for particular comment, there is a distinction in the case of the transition of public transportation in Montgomery from electrically driven to gasoline motor driven conveyances, because it was in Montgomery that the first completely electrified street railway system in the Western Hemisphere was put into operation on April 15, 1886.

Commenting on this event, *The Electrical World,* in its issue of March 12, 1887, said:

> "The spirit of progress is abroad in the Southland; its handmaid is electricity . . . Montgomery leads the van, and other Southern cities are soon to follow. It is, in fact, a most striking evidence of the new spirit of enterprise in the South that so much of the new electric lighting and new electric street railway business is being done there."

That spirit of enterprise has never died in Alabama. The fortitude of those sturdy citizens of Reconstruction Days, the fruits of whose individual initiative we enjoy today was matched in later years by such men as William Patrick Lay and James Mitchell, practical dreamers, workers and engineers, whose vision and tireless devotion to the ideal of the economic and industrial development of Alabama resulted in the great pioneer hydro-electric system of the State, second to none in the Nation in the quality of service rendered at a price to its customers matched by few.

Great as the heartaches and disappointments of Messrs. Lay and Mitchell were, prophetic as their vision has proven to be, they must have been paralleled during those years 1880-1900 in the hearts and minds of those Montgomery citizens of courage and fortitude who, with little more than a passion for progress and an intense pride in their historic city on the banks of the Alabama, devoted their money and energy to an enterprise, the vicissitudes of which were many.

Disheartening mishaps left their mark on stalwart souls and already thin purses, and although the faith of those sturdy pioneers must have wavered, courage was never routed and this beautiful city progressed.

While in a few years Montgomery may remember the street railway only as a relic of bygone days, it will have been more than that. It was the symbol of an era, because the beginning of the operation of electric street railways in America marked the beginning of the electrification of industry, for if not the first, then among the first, the electric street car marked the early application of the electric motor to industrial service and inaugurated the use of the electric dynamo for commercial purposes other than lighting.

Fifty years ago, there was no means of distributing energy on a widespread basis, because of the inherent limitations of mechanical drives, and because of the expensive and impractical machinery required for the development of small amounts of energy. This meant, for example, that there was no feasible means of delivering to a residence the small amount of energy required to operate a fan.

The practical application of the electric motor to traction, of which the Montgomery railway was the pioneer, was, therefore, highly significant as being the first case where, through the medium of electricity, energy was successfully distributed from a central source. Substitution of the electric motor for the long-eared mule as motive power for street cars was as great a forward step fifty years ago as the commercial extraction of energy from the atom would be today. It marked the real beginning of the electric *power* industry, as distinct from lighting.

From this point, it was a relatively small step to apply motors to other jobs requiring mechanical energy, previously supplied through the various forms of mechanical drive. As a consequence of this electrification of industry, factories were freed from the previous restriction as to location. No longer was every cotton mill necessarily located on the bank of a New

England stream, with consequent congested slum districts, while other sections of the country pursued a one-sided agricultural life. Instead, mills and factories can now locate almost anywhere, taking advantage of favorable labor and transportation conditions, and at the same time introducing industry into many communities once entirely agricultural. The sociological and economic consequences of such a population shift have surely altered the course of American civilization, and for the better.

The high-speed electric elevator of today makes possible the great height of the modern skyscraper, without which the development of our larger cities would have been much different. The entire course of business and commercial progress has thus been greatly influenced by the electric motor.

Many of the conveniences of modern life, not themselves electrical, owe much to this pioneer street-car system which first put electricity into harness. The modern low-priced automobile exists because of mass production and the manufacturing economies which accrue from unrestricted choice of location, so as to take advantage of raw materials and markets. Could it have been produced without industrial electrification? I think not. As the gasoline engine was developed to its present high state of perfection for the automobile, it made possible the motor truck and the passenger bus. Thus, it is that the Montgomery street railway, though dead, lives on. It created the device which displaces it. In a broad sense this bus system owes as much to electricity as did the original railway.

Not only did the electric motor supplant mechanical drive in factories, but it created many of the conveniences of modern life which could not have been practically developed otherwise. From the hair-dryer in milady's boudoir to the pump at the farm well, electrical appliances of every type have become available to rich and poor alike, supplying economically, at the required time and place, the small amount of energy which could not have been delivered in any other way. In lifting these countless burdens from the shoulders of men, the electric motor has made a great contribution to American civilization.

The pioneers through whose vision the Montgomery street railway became an actuality encountered serious difficulties in applying, for the first time, electricity to traction work. These difficulties were largely of a technological nature. At times seemingly almost insuperable, they were overcome by persistence and engineering ingenuity, making possible the widespread benefits of electricity which we enjoy today.

That this was so may be inferred from numerous references; for instance, in 1888 at a convention of the National Electric Light Association complete statistics concerning the operation of electric railways seemed at that time to be available. However, in commenting on the stationary motor business, the president of that Association stated that it was impossible to collect reliable information relative to the stationary motor business, but that it was known that there were at that time "single factories employing no less than 1,500 hands each in the manufacture of electric motors . . . " Most of the discussion of stationary motors was in the nature of a prediction, indicating that the general industrial use of the stationary motor followed by several years commercial electric railway operation.

Perhaps the most conclusive reference appears in the book, *Economic Development of the United States*, by Isaac Lippincott, who reviews the development of the telegraph in 1850, its application to stock tickers and burglar alarms in 1860, the development of the telephone and electric lighting in 1880 and the general expansion of the electric railway in 1890 and *"in 1900 the unprecedented adoption of the motor for power transmission, factories, etc. . . ."* This seems to demonstrate that the electric railway had been in commercial use for nearly a decade before the general adoption of the electric motor for industrial use.

In 1884 there were less than 100 electric motors in operation in the United States for any purpose. By 1890 this number had increased to 15,000, but even as late as 1899, only 5% of industrial power was supplied through electric motors as against 82% in 1929.

In 1888 it was proudly reported that there were at that time 34 electric railways "of record" in operation in the United States, having an "aggregate of 138 miles of single track, operating 223 motor cars." By 1917, the peak year, the number of companies had increased to

1,307; the investment to $5,500,000,000; with annual gross revenue of a little over one billion dollars. By 1932 the number of companies had decreased to only 706. Net earnings of the entire electric railway industry were at their peak in 1922 at about 74 million dollars. By 1932 there were no net earnings, but *losses aggregating 9½ million dollars*. It is interesting to note that altho net earnings decreased 113%, total wages and salaries which in 1922 were 446 million dollars had decreased only about 37% by 1932. Total number of employees in the street railway industry had decreased by about the same percentage.

It might well be said, therefore, that even though the street car is passing into the memory of man, its invention was the event which ultimately led to the electrification and a greater mechanization of industry, bringing about shorter hours for labor and the freedom of home-makers from drudgery.

In commemoration of the passing of *"The Lightning Route,"* as the Capital City street railway system was proudly known in its early days, it therefore seems fitting that there should be some symbol of this event, and likewise a complete historical record of the birth, life and death of this phase of American transportation facilities. This booklet is published primarily as a keepsake for those loyal employees conducting the street railway operations of the Alabama Power Company in Montgomery, many of whom have spent the better part of their lives in the operation of street railway systems in the City, and as a memorial to the pioneers associated with its development. For the person who is interested in tracing in detail the inception and close of the first electrically operated street railway on the American continent, there is on file in the Department of Archives and History of the State of Alabama, in the Carnegie Library of Montgomery and in the Montgomery office and the general offices of the Alabama Power Company in Birmingham, complete reference data relating to it.

That such an epoch-making development should pass into obsolescence in such a short period as fifty years is indicative of the fact that "Time Marches On" and that many things considered permanent today may tomorrow be the relics of the past.

The withdrawal of Alabama Power Company from street railway operation in Montgomery demonstrates its policy to always keep abreast of the times so as to permit the citizens in the territory it serves to enjoy the modern developments relating to the industry in which it is engaged.

It is with deep regret that this occasion marks the separation of many loyal employees from association in their work with other employees of Alabama Power Company. However, such separation does not mean the ending of friendships, and for myself and other executives of the Company, I express a sincere feeling of gratitude, not only for loyal services rendered, but a desire for the continuation of the friendly association and understanding we have enjoyed in the past.

Sincerely yours,

President.

Montgomery,
March, 1936.

The LIGHTNING Route

A Milestone in the March of Progress

1886 — 1936

THE CAPITAL CITY of Alabama has enjoyed street car service for over fifty years, and the abandonment of such service is of particular interest historically because the first successful commercial electric street railway was operated on the streets of Montgomery. Much of the history of street car transportation in the city during this fifty year period is of great interest and its preservation has been deemed desirable, but the story in detail is too long for the purpose of this sketch.

Herein are set out some of the outstanding features, and all statements are substantiated by a complete record which has been filed in the offices of Alabama Power Company in Birmingham and Montgomery, in the Carnegie Library, Montgomery, and the Department of Archives and History at the State Capitol.

The two outstanding epochs are the inauguration of street car service by mule drawn cars and the beginning of electric service, hailed by *The Montgomery Advertiser* respectively as "Jingle Bells" and "The Lightning Route."

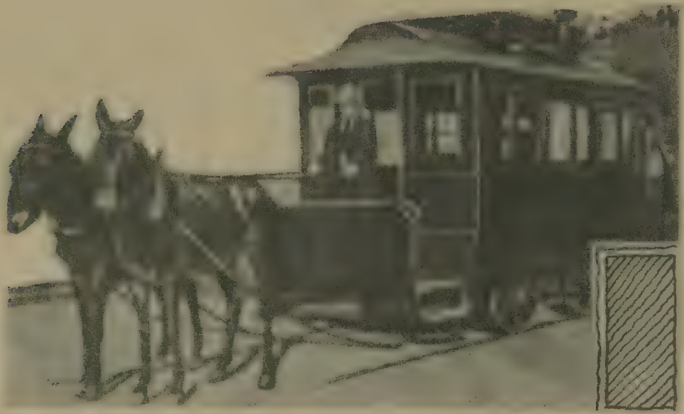
Joseph Arthur Gaboury, engineer and capitalist, a Canadian by birth, came to Montgomery in 1884 directly from Columbus, Georgia, where he had built and operated a mule-drawn street railway system.

The Capital City Street Railway Company was incorporated under the laws of Alabama on November 14, 1884, by Messrs. Joseph Arthur Gaboury, Thomas Gardner Foster, Gordon McDonald, Frank J. O'Dwyer and Henry A. Apperious. In addition, the records show that Messrs. A. M. Kennedy, Josiah Morris, J. C. Haas and Charles A. Gaboury were stockholders. They were all well-known citizens of Montgomery except the Messrs. Gaboury.

The City of Montgomery granted the company a franchise on November 17, 1884. While franchises had been granted to others in the city, the Capital City Street Railway Company was the first to build and operate a street railway in Montgomery. This company was organized and the railway built through the efforts of Mr. Gaboury, who was the controlling stockholder.

In the fall of 1885 while on a visit to his old home in Canada, Mr. Gaboury met Charles J. Van Depoele, a Belgian electrical inventor of the time, who for several years had been experimenting with a car driven by electricity as its motive power. At that time electricity had no standing and no use outside of the telephone, the telegraph and the arc lamp, and its application as a motive power had not been suggested to an incredulous world. Edison's incandescent carbon filament lamp had not yet come into general use.

Van Depoele had been conducting some experiments in Detroit, hoping to improve the Brush arc light system. While conducting these experiments it is said that he met the advance agent of John Robinson's circus and proposed to him that a demonstration of his experiments with the arc light would be a drawing card for the circus. The agent thought so too and the deal was closed.



What the First Street Car in Montgomery Looked Like

Van Depoele had been borrowing power to operate his arc lights, but having signed a contract with the Circus to put on an exhibition, he was faced with the necessity of finding an engine to operate his generators. His father, apparently a man of some means but discouraged with his son's tinkering, refused to lend him money with which to buy an engine. Apparently Van Depoele was successful in obtaining sufficient funds elsewhere with which to purchase an old worn-out engine, which he patched until it could give wheezy and uncertain service.

Believing that his arc lights required separate generators, Van Depoele operated a generator for each. With the idea that the speed of the generators, each of which was separately belted, might be kept constant by wiring them together, he made such a connection. It is related that in the midst of his experiments, the belt on one of the generators snapped. Its light flickered a moment and then burned on. Surprised, Van Depoele glanced at the pulley wheel of the "dead" generator, but it still revolved, apparently without force or power from the engine, its driving belt being broken.

Stirred with excitement, he seized a piece of timber and thrusting it into the rotating mechanism of the generator, tried to stop it. The timber was dashed from his hands and Van Depoele, with what must have been great mystification, observed that the rotation of the mechanism was in the opposite direction from what it was when the belt was turning it.

> *If, wondered Van Depoele, power transmitted through a wire ten feet long could cause a piece of electrical mechanism to rotate without any other source of power, why could it not also perform that service at any point along a wire ten miles long?*

Van Depoele, it is said, gave his exhibition at the circus, but his mind was filled with greater visions, for he had conceived the idea of placing a rotating electrical mechanism on one of the street cars of the day and propelling it with electrical power instead of mule power.

In time he acquired one of the original ancestors of the "Toonerville Trolley," so well known to all. He installed his electrical machine, modernly known as a motor, strung some wires and laid a makeshift track in his back yard, experimented with it and attracted so much attention that he decided to exhibit it at the Agricultural Fair at Toronto, Ontario, in 1884.

In 1885 he arranged to run his electric car over a track between the terminus of the Toronto Street Railway and the Fair Grounds. Here it was that Gaboury, visiting his old home in Canada, and deciding to visit the Fair Grounds before leaving for the South again, first observed the spectacle of a public conveyance propelled by other than animal or steam power.

He stopped the man who was running it and questioned him as to the characteristics of the strange conveyance. The operator, an Englishman, knew as little of it all as his interrogator.

The owner and inventor was not at the fair grounds. Mr. Gaboury left his card with an urgent request for the owner, Mr. Charles J. Van Depoele, to call at his hotel to see him.

When Van Depoele went to the hotel that night, they talked of this invention until after midnight, and Mr. Gaboury was greatly impressed. He found that Van Depoele had been to street car company managers all over the North and Canada, but they only scoffed at his idea. Before Mr. Gaboury left Toronto, plans had been formulated for Mr. Van Depoele to come to Montgomery, which he did and spent several months there. Mr. Gaboury decided to give his idea a fair test in Montgomery, and his associates supported him.

On November 2, 1885, the Capital City Street Railway Company took the first step toward the operation by electricity by filing its petition on that day with the City Council asking for permission to run its cars by electricity. However, this privilege was not granted until January 4, 1886.

On March 25, 1886, between 12 and 1 A. M., Gaboury and Van Depoele made a secret trial trip on one of the cars equipped with the electric motor. *The Montgomery Advertiser* commented as follows in its issue of March 25, 1886:

> "Last night between twelve and one o'clock a street car was seen coming up Commerce Street minus mules. It was the first trial trip with the new electric motor and it worked like a charm till the curve was reached at Court Square. A hitch occurred through some defect of the belting, which an endless chain belt will put to rights. Four trips were made up and down Commerce Street and the car moved as easily and smoothly as a ghost in the clear moonlight, and at any speed desired. At half past one the mules were hitched in and the car pulled around the curve and up the hill to try it on the upper level.
>
> "The company proposes to test the system thoroughly by moonlight before risking an exhibition in the light of day and in the sight of the curious public."

From that time on until regular service was established, all trips were made during the early hours of the morning while the citizens slept. Some mishap which might undermine the confidence of the public was feared. Finally, with fears allayed, regular passenger service was established on April 15, 1886, at 10 A. M. with two cars in operation on the Court Street line. *The Montgomery Advertiser* of April 15, 1886, announced the success of the "Lightning Route," as some called it, commenting as follows:

> "The Capital City Street Railway Company had the two new cars out and running by the electric motor system last night. One of the cars had never run before, but both went like a charm and made the round trip without a hitch or bobble.
>
> "The electric street railway in Montgomery is a success. Both the cars on the Court Street line will be operated by the motor system today, beginning at ten o'clock this morning. Heretofore, no attempt has been made to run the cars by the Lightning Route in the day time, as the running was only to test the system. Some unexpected delay has been met in getting the new machinery in working order. The company ordered a steel roller chain, and an iron chain was sent them. It gave way and the steel chain was ordered again, but did not come promptly on account of the flood and high water. But everything is in running order, and the electric system will prove a great success in spite of all doubting.
>
> "People who prefer the Lightning Route to the Texas mules can make the change this morning on the Court Street line."

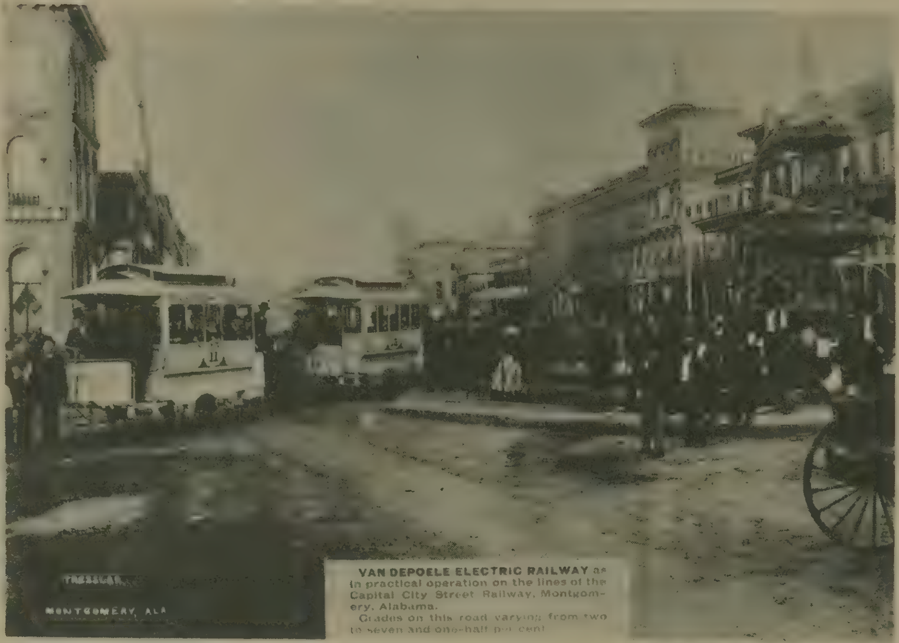
Organizer, Builder
James Arthur Gaboury
1851—1915

It might be said that the present modern bus transportation system of Montgomery is due to the efforts of Mr. Gaboury, who organized and built the mule-drawn street car system of Montgomery. Later, becoming interested in the possibilities of the electric street railway, Mr. Gaboury, because of his vision and pertinacity succeeded in obtaining capital with which to construct and operate the first completely electrified street railway system in America, which just fifty years later is being displaced with a bus transportation system.

Mr. Gaboury's enthusiasm over the electrified street railway was so contagious, the inventor of the electric street car, Mr. Chas. J. Van Depoele came to Montgomery and there saw his dream of electric transportation come true in the first completely electrified street railway system among peoples of the Western World.

Business Was Good

In the early days, citizens of Montgomery vied with one another for the distinction of being among the early riders on the cars of the first completely electrified street railway system this side of the Atlantic. As can be seen from this photograph, taken in 1887, the passenger capacity of the early cars was extremely limited.


TREASURER
MONTGOMERY, ALA
VAN DEPOELE ELECTRIC RAILWAY as in practical operation on the lines of the Capital City Street Railway, Montgomery, Alabama.
Grades on this road varying from two to seven and one-half per cent

The company and the public were well pleased and the cars were crowded with passengers. The route ran from Tallapoosa Street up Commerce Street through Court Square, up South Court Street to Grove Street, thence to Hull Street, down Hull to Scott Street, the end of the old mule car line, a distance of over one and a half miles. Here the old cumbersome trolley was reversed and the return trip made to the foot of Commerce Street. Those early cars had a speed of six miles per hour and were able to negotiate grades of more than 7%. They ran 16 hours a day.

The *Electrical World* of August 14, 1886, contained an extensive article on the Van Depoele Electric Railway System, as it was called, in the course of which there are two illustrations of the Montgomery electric street railway, concerning which this is said:

> "At Montgomery, Ala., the Capital City Street Railway have been running two cars for some time (Figs. 5 and 6).* The grades are over seven per cent; the distance is over 1½ miles, motors are placed on the platform of each car and do the work well. The speed over the grade is six miles per hour. The cars run 16 hours per day, and the generator is driven by an old-fashioned slide-valve engine stationed 250 feet from the boiler. The amount of coal consumed per day is 3,000 pounds, including getting up steam from cold water."

On March 12, 1887, the *Electrical World* carried another article concerning the Montgomery system, in which it was stated that:

> "The Capital City Electric Railway of Montgomery, Ala., which commenced running its street cars by the Van Depoele electric railway system one year ago, is now equipping its road with the most complete and extensive railway outfit in the world. The total length of track being equipped is over eleven miles. The accompanying diagram shows the lines of the road. It will be easily understood by anyone familiar with the city."

Again, in an article appearing in the April 30, 1887, issue of the *Electrical World*, the following reference was made to the Montgomery system:

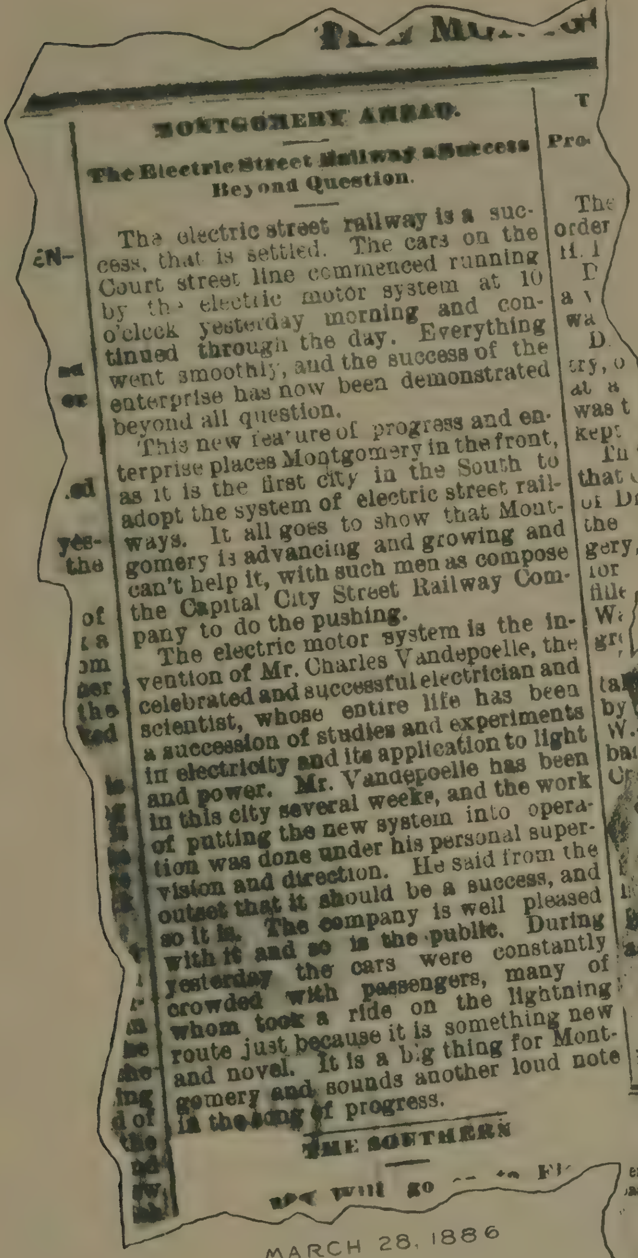
> The electric railway at Montgomery, Ala., which will soon be put in operation,† is without doubt the largest undertaking of the kind thus far attempted. The initial plant consists of 14 cars equipped with 10 h. p. motors and four cars with 20 h. p. motors . . . The whole plant in Montgomery, track, cars, steam and electric power, will be made a model in every respect. When all is in operation (which will be within two or three weeks) this will be the largest electric railway plant in the world."

Miss Toccoa Cozart

In 1886, at about the time this picture was made, Miss Cozart enjoyed the distinction of being the first gentlewoman to ride on the electric cars of the Capital City Street Railway Company. The street cars were known as "The Lightning Express." It should be mentioned that it is also claimed that Mrs. J. C. Haas, wife of one of the organizers of the original mule-car company was also a passenger on the first electric street car.

**See reprints of pages from Electrical World on last pages of this booklet.*

†This statement was inaccurate as the system had been in operation for some time as shown by preceding excerpts from Electrical World.



MONTGOMERY AHEAD.

The Electric Street Railway a Success Beyond Question.

The electric street railway is a success, that is settled. The cars on the Court street line commenced running by the electric motor system at 10 o'clock yesterday morning and continued through the day. Everything went smoothly, and the success of the enterprise has now been demonstrated beyond all question.

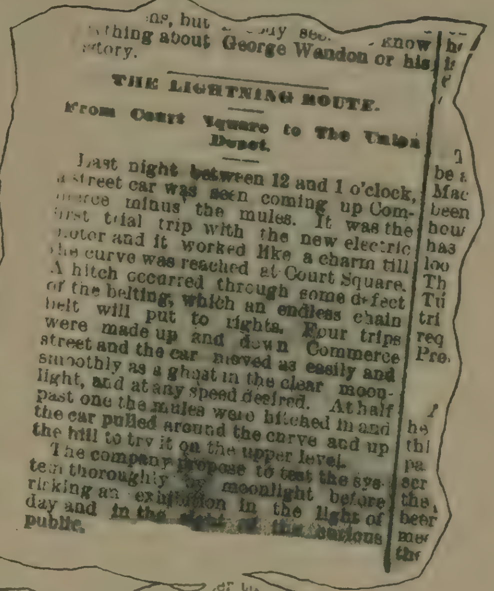
This new feature of progress and enterprise places Montgomery in the front, as it is the first city in the South to adopt the system of electric street railways. It all goes to show that Montgomery is advancing and growing and can't help it, with such men as compose the Capital City Street Railway Company to do the pushing.

The electric motor system is the invention of Mr. Charles Vandepoelle, the celebrated and successful electrician and scientist, whose entire life has been a succession of studies and experiments in electricity and its application to light and power. Mr. Vandepoelle has been in this city several weeks, and the work of putting the new system into operation was done under his personal supervision and direction. He said from the outset that it should be a success, and so it is. The company is well pleased with it and so is the public. During yesterday the cars were constantly crowded with passengers, many of whom took a ride on the lightning route just because it is something new and novel. It is a big thing for Montgomery and sounds another loud note in the song of progress.

THE SOUTHERN

MARCH 28, 1886

MARCH 25, 1886



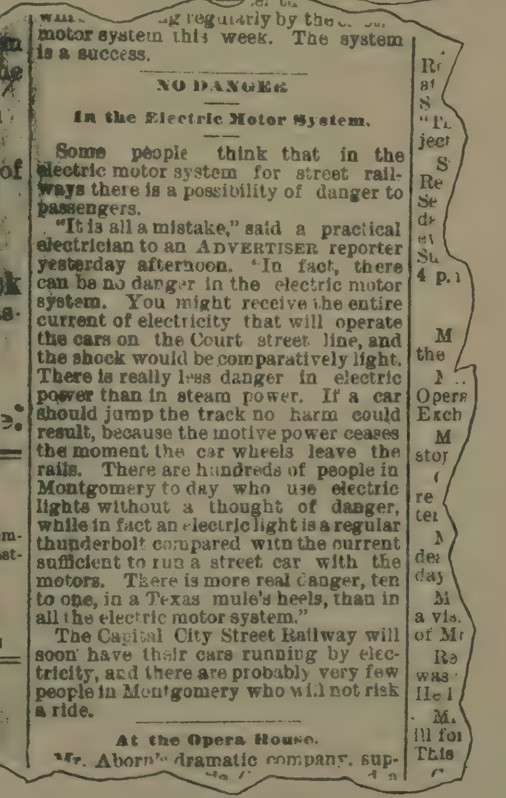
...ns, but ... ...y see... ...know ...thing about George Wandon or his ...tory.

THE LIGHTNING ROUTE.

From Court Square to The Union Depot.

Last night between 12 and 1 o'clock, a street car was seen coming up Commerce minus the mules. It was the first trial trip with the new electric motor and it worked like a charm till the curve was reached at Court Square. A hitch occurred through some defect of the belting, which an endless chain belt will put to rights. Four trips were made up and down Commerce street and the car moved as easily and smoothly as a ghost in the clear moonlight, and at any speed desired. At half past one the mules were hitched in and the car pulled around the curve and up the hill to try it on the upper level.

The company propose to test the system thoroughly by moonlight before risking an exhibition in the light of day and in the sight of the curious public.



...g regularly by the ... motor system this week. The system is a success.

NO DANGER

In the Electric Motor System.

Some people think that in the electric motor system for street railways there is a possibility of danger to passengers.

"It is all a mistake," said a practical electrician to an ADVERTISER reporter yesterday afternoon. "In fact, there can be no danger in the electric motor system. You might receive the entire current of electricity that will operate the cars on the Court street line, and the shock would be comparatively light. There is really less danger in electric power than in steam power. If a car should jump the track no harm could result, because the motive power ceases the moment the car wheels leave the rails. There are hundreds of people in Montgomery to day who use electric lights without a thought of danger, while in fact an electric light is a regular thunderbolt compared with the current sufficient to run a street car with the motors. There is more real danger, ten to one, in a Texas mule's heels, than in all the electric motor system."

The Capital City Street Railway will soon have their cars running by electricity, and there are probably very few people in Montgomery who will not risk a ride.

At the Opera House.

Mr. Aborn's dramatic company, sup-

APRIL 16, 1886

"More Danger in a Texas Mule's Heels"
Averred Old Time Electrician

The above clipping, reproduced from the March 28, 1886, *The Montgomery Advertiser* indicates that there was skepticism about the safety of riding the electric cars, and how a "practical electrician" emphasized their safety.

That some troubles were encountered during the trial runs and that the electric cars did not immediately displace the Texas mules is indicated in the newspaper item above, reproduced from the March 25, 1886, issue of *The Montgomery Advertiser*.

At last, troubles were eliminated and according to *The Montgomery Advertiser's*, April 16, 1886, account (here reproduced) at the inauguration of electric street car operation in Montgomery, "everything went smoothly," and sounded "another loud note in the song of progress."

The motors operating these cars were located on one of the platforms and to counterbalance the weight of the motor, a weight had to be placed on the opposite end. The power was transmitted from the motor to the car wheels by a steel roller chain.

The trolley consisted of an over-riding wheel, held on to the trolley wire by smaller wheels and the current was conveyed from it through a flexible cable which passed through the hood of the car to the motor.

This type of trolley caused an endless amount of trouble, because no means could be devised whereby the cars could pass each other, and when two cars met, the trolleys had to be "swapped." In doing this the motormen often received severe shocks.

Sometime later when Messrs. Gaboury and Van Depoele were discussing this difficulty, an idea for the improvement of the trolley occurred to them. A drawing was made and the Montgomery Iron Works constructed a working model. The principle of this trolley is the same as that of today. Neither Gaboury nor Van Depoele realized the importance of this improvement, and it was later sold with other improvements to the Thomson-Houston Company, the predecessor of the General Electric Company. This trolley design became the center of a long and costly litigation between the General Electric and Westinghouse companies.

Apparently, outside of some difficulties inherent in the new experiment, it was considered highly successful, because on July 30, 1886, just three and one-half months after the first two cars were electrified and put into operation, Gaboury predicted that by October electric cars would be operated over the entire system—the enormous distance of six miles. It was announced that the stable of Texas mules would be on sale in the fall.

Later in the year, the company purchased engines sufficiently large to generate current to operate all cars expected to be put into operation on all of the six miles of track, and for three proposed additional lines.

The business of the Capital City Street Railway Company, appearing to be lucrative, suggested to certain gentlemen of the day that if one street railway could be successful, then two would be twice as successful; so on July 9, 1885, the Montgomery Street Railway Company, known as the "Green Car Line," was organized by John W. Watts and others. This company began operations with a mule car in April, 1886, but was absorbed in May, 1887, by the Capital City Street Railway Company.

Suspension in service, judging from accounts appearing in *The Montgomery Advertiser* issues of the time, were not infrequent. Tracks seemed to have the habit of becoming covered with mud, boilers had to be cleaned, motors and generators broke down, but resumption of service followed in due course.

In December, 1886, while the additional electrification predicted for October had not been completed, the company purchased a plot of ground, the Bolling Hall tract, which became known as Highland or Forest Park, and planned to extend street car service to it. That section is now known as Oak Park.

By June 22, 1887, fifteen miles of line were electrified and placed in operation. About this time inquiries were being received from the cities of Atlanta, Georgia; Balboa, Spain and Sacramento, California, concerning the reliability of electric street car service. The inquiry from Sacramento, which came in the form of a questionnaire, is particularly interesting, and this questionnaire and the answers are given herein, as taken from *The Montgomery Advertiser* of Friday, June 24, 1887:

> "The fame of Montgomery's electric railway has spread over to Sacramento, and that city is contemplating profit by our experience. The mail last night brought the Advertiser a letter of enquiry with the statement that:
>
> > 'It is contemplated to build an electric railroad here if adapted to local conditions, and we would esteem it a favor if you would furnish us the following information, or put our letter in the hands of someone that will.'
>
> "The letter is from James McClatchy & Co., and their enquiries and the answers which are given them are as follows:
>
> *"First. How soon is it expected to be completed?*

Electrified Street Railway Led to Development of Public Parks

Oak Park Pavillion was built by Highland Park Improvement Company while construction of the street railway electrical system was going on. This was Montgomery's first public park. Previous to the opening of this park in the Spring of 1887, due to no suitable places for families and swains to gather for community enjoyment, it was customary for them to gather in the cemeteries for their Sunday afternoon diversion.

"It is already completed and in full operation, everyone of the sixteen cars being operated by an electric motor.

"Second. What was the evidence of success so far as the road has been run?

"After a thorough test of six months on a single line, it was adopted as a system. Its success is declared by the Railway Company to be unequivocal.

"Third. Does it prove convenient and economical?

"Its convenience in every way is marked. Cars stopped easily, there is no heat nor dust, and a single man operates it, sitting on the front platform, by turning a crank.

"Fourth. Can it be relied on at all times and in all weather?

"There never has been any trouble and there is no sign that any will be experienced. In rainy weather it is necessary to protect the motor by an oil cloth cover.

"Fifth. Is there no objection to the overhead wires in the business streets?

"Some people object and some do not. The wires are no more unsightly than telegraph and telephone wires.

"Sixth. Is expense the only objection to underground conduit?

"This, the Advertiser does not know, but supposes it is.

"Seventh. How many cars are expected to be run, and of what horsepower are the motors?

"Sixteen cars with motors are now in operation, which is sufficient for ordinary purposes. On extra occasions two extra cars are attached to a car with a fifteen horsepower motor, which pulls all three up hill and down with ease. The motors in use are of varied power, the largest being fifteen horsepower.

Pickett Springs Park
Electric Park

These parks were built by competing street railway companies in Montgomery to attract patronage to their lines. Incidentally, they gave Montgomerians some place else to go.

> "*Eighth. What is the power of the generator?*
>
> "It is 250 horsepower.
>
> "*Ninth. What is the cost of the whole road thoroughly equipped?*
>
> "The whole plant of nearly fifteen miles cost $175,000.
> "It may be added in a general way that economy in operation is 40 per cent. as compared with mules and horses, and the schedules are faster and more regular."

On July 25, 1887, occurred an accident which seems to have suggested the first of proposed anti-electric utility legislation in the Halls of Congress, for on that day a wire fell and a valuable mare being driven by Governor Seay, of Alabama, was electrocuted. *The Montgomery Advertiser* of July 26, 1887, contains an interesting story of this incident.

Excepting mishaps, considered normal in the operation of the early street railway systems operations of the Montgomery system went along fairly well until 12:45 A. M. June 30, 1888, when the fire alarm sounded. When the fire department reached the scene of the fire, the barns and power plant were a raging inferno, and were completely destroyed, as well as many of the cars. *The Advertiser* of July 1, 1888, stated:

> "The spot where the building and plant of the electric railroad company were located presented a scene of wreck and ruin yesterday morning.
>
> "Mr. E. B. Joseph, President of the Company, was seen and interviewed yesterday about the damages and losses resulting from the fire, and future plans for operating the first street railroad system . . . We will commence running the cars again with the mules as soon as we can buy the mules. We sold out our mules last year after adopting the electric system and will have to buy again. We will only run with the mule system, however, until we can put in another electric plant, or adopt some other motor power. The company, of course, has not had time to determine what plan to pursue."

Announcement was made several days later that operations were to continue under mule power, and on July 29, 1888, *The Montgomery Advertiser* reported that 80 Texas mules had been ordered. As sixteen mules were required for each car in operation, it seems that the entire rolling stock of the company was at that time five cars.

In commenting on the news that the mules had been ordered, *The Advertiser said:*

> "Whether this means that the negotiations are in a delightful state of uncertainty, or that an electric plant can't be put up quick enough to justify allowing the tracks to remain idle in the meantime, nobody with the company knew. . . It is hoped that the negotiations for the electric plant will be carried on to a successful conclusion. In the meanwhile, the Texas mule will be welcomed as better than walking."

Electric street cars seem not to have made their appearance within the next nine months, because in March, 1889, a clamor went up beseeching the new owners of the street railway company, Messrs. I. Pollak, J. W. Dimmick and others, to purchase steam engines by which the cars were to be drawn. Steam drawn cars were known as "dummy" systems.

On July 1, 1889, the Capital City Street Railway Company became known as the Montgomery Terminal and Street Railway Company, which was the style given to the company formed by Messrs. Pollak, Dimmick and others after their purchase of the assets of the original company. Colonel R. A. Mitchell, who is now a Vice-President of Alabama Power Company, was elected secretary of the new company, and later became general manager.

On February 9, 1892, Messrs. R. P. Dexter and W. A. LeBron organized The Montgomery and Cloverdale Electric Railway Company. This company proposed to operate by electricity, serving the Cloverdale section, which was adjacent to the then city limits. Construction of the lines was begun early in that year and operation with seven cars was started September 29, 1892. On September 15, 1892, the West End & Riverside Electric Street Railway Company, later known as the Montgomery Suburban Street Railway Company, was organized by Dr. Samuel D. Seelye, M. E. Satchwell and J. M. Garrett, Jr., now City Engineer of Montgomery.

This Company was operated under the franchise granted to Dr. Seelye and associates by the County Board of Revenue November 14, 1891, and the City of Montgomery January 22, 1892. The road was completed and electric cars started operating Sunday, February 26, 1893.

During 1892 the Montgomery Terminal and Street Railway Company changed its name

Commerce Street as it Appeared About 1893

This marks the original route of the first completely electrified street car system in the Western Hemisphere.

to Montgomery Street Railway, and later purchased the Cloverdale Company's lines. Shortly afterward the entire system was again electrified, and "mule power" was not used afterward.

The electric railway business seemed to be an inviting field, and on January 7, 1896, the Montgomery Suburban Street Railway Company was organized. It laid one block of track on Perry Street but never operated any cars over it.

During 1900 Richard Tillis acquired the interest of J. W. Dimmick in the Montgomery Street Railway.

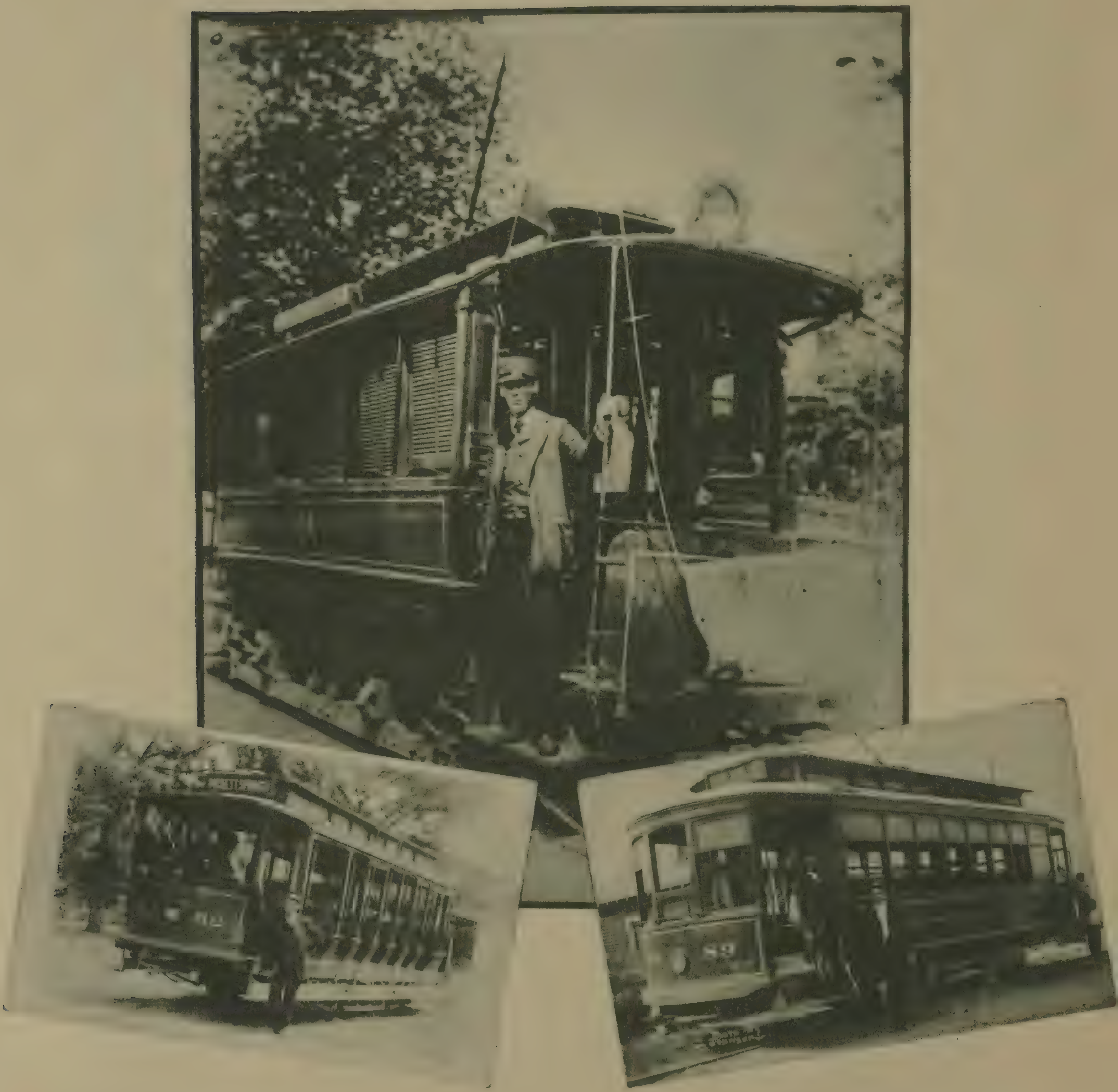
On July 23, 1902, the Montgomery Traction Company was incorporated by Barrie M. Holt and his associates. In 1902 Mr. Holt planned an electric railway to Pickett Springs, to operate under franchise originally granted in 1889 and over rights of way acquired by him. The engineering firm of J. G. White & Company entered into contract with Holt to build the new line, but meanwhile endeavored to buy out the Montgomery Street Railway. The first record of interconnection of trackage and the granting of mutual transfer privileges appears as of August 4, 1902, when the Montgomery Suburban Street Railway Company and the Montgomery Street Railway made such arrangements.

The hodge-podge of street railway systems in Montgomery was eliminated on April 13, 1906, by the consolidation of the Montgomery Street Railway, the Montgomery Suburban Street Railway Company, and the Montgomery Traction Company, into a corporation known as the Montgomery Traction Company. On November 23, 1908, Richard Tillis acquired all of the stock of the Montgomery Traction Company which in 1910 built the steam electric plant on the Alabama River in North Montgomery, and which became the property of the Alabama Traction Company. This was the first steam turbine driven plant in Montgomery.

November 1, 1910, another street railway, known as the Alabama Traction Company, was incorporated by Messrs. Abercrombie, Woodward and associates. This company built only three blocks of double track on Lee Street from Union Depot to Montgomery Street. It planned to operate its cars by storage battery, over its tracks and certain tracks of the Montgomery Light & Traction Company (known as Montgomery Traction Company until December 29, 1911) which it attempted to condemn. In this it was unsuccessful—the tracks were not connected with any other street railway system, and no cars were operated over them while owned by the Alabama Traction Company.

The Montgomery Light & Traction Company was forced into receivership January 10, 1919, and Mr. Ray Rushton of Montgomery was appointed Receiver by the U. S. District

"Modernization" in the Old Days



Even back in the 1880's and '90's, "modernization" overcame the earlier equipment. In the pictures above are shown several pieces of "modernized" equipment. *Center:* Modern car of 1893, manned by E. W. Platt; *lower left,* "Summer" Car, 1917, with O. C. Cone, retired, at the controller; *lower right,* "Winter" car, 1917, with B. F. Boockholdt, present railway cashier, grasping handrail.

Court. On July 8, 1920, control of the company was acquired by Henry L. Doherty & Co. Mr. Rushton resigned as Receiver on July 8, 1921, and Mr. S. B. Irelan was appointed in his place.

On December 29, 1922, an interesting resolution appeared in *The Montgomery Advertiser*, reading as follows:

> "Resolved by the Chamber of Commerce of Montgomery that we extend an invitation to the Alabama Power Company to come into Montgomery, feeling that the best interests of the Community would be conserved by their coming here.
>
> "That we pledge the hearty cooperation of the Chamber of Commerce in the efforts of Alabama Power Company to build up the industrial and commercial interests of this community."

After extensive negotiations, the entire property was acquired by the Alabama Power Company. On February 21, 1923, Mr. J. M. Barry, who is now Vice-President and General Manager of Alabama Power Company, was appointed Division Manager.

It takes no careful student to judge from this brief history of the street railway in Montgomery, and incidentally the electrical industry, which grew out of the street railway, that many vicissitudes, forced sales and final receivership were the result of unrestrained competition, resulting in poor service and high expenses.

After the Alabama Power Company acquired the railway system it made various improvements in the way of eliminating duplications and obsolete facilities, involving approximately $215,000, and put the Montgomery street railway system well above the average for cities of its size, as far as railway service and facilities were concerned.

By 1932, railway revenues were reaching a low point; the public was no longer interested in maintaining the service, and so in that year buses were substituted on the Riverside line and in February, 1934, buses were substituted on the West End line and the route extended to Maxwell Field, with the approval of the City Commission.

These events merely foreshadowed the passing of the entire system.

Forerunners of the Discontinuance of the Street Railway in Montgomery

These buses, put into operation March 8, 1932, substituting the old Riverside street car line, heralded the beginning of the displacement of steel wheels against steel rails by rubber on concrete in Montgomery.

Seen in the picture are W. J. Ginnavan (*left*) Superintendent, (*deceased*) and (*right*) J. H. Bagley, Chief Inspector. In the buses are Operators J. D. Bailey and M. R. Outlaw.

On December 3, 1935, the Montgomery City Lines, Inc., were granted by ordinance the authority and privilege to maintain and operate a motor bus transportation system in the City of Montgomery.

On January 7, 1936, the Alabama Power Company was granted by ordinance from the City of Montgomery, the authority, privilege and right to abandon its street railway system, including motor coach transportation service and to surrender all franchises under which such system was operated.

On January 21, 1936, the Alabama Public Service Commission approved the petition of the Alabama Power Company, thus granting authority to discontinue operation of and abandon the street railway, including motor coach transportation service.

At the time of publication of this booklet, it is expected that the new, modern, up-to-date gasoline buses will be put into service within a few days by the Montgomery City Lines, Inc., thus ending the "Lightning Route" in Montgomery.

First and Last Presidents

of

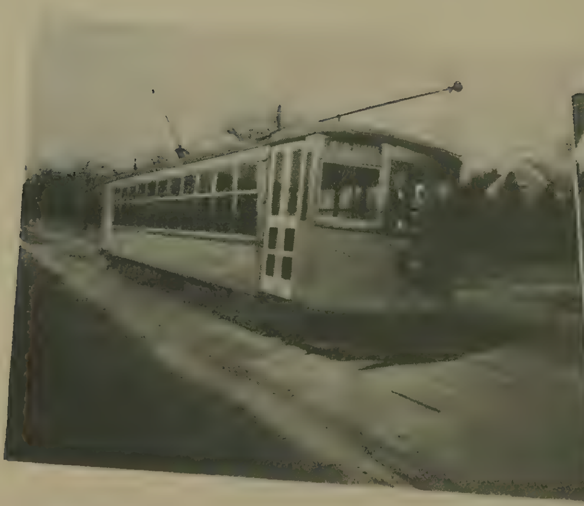
First Completely Electrified Street Railway in America

E. B. Joseph
President 1885—1889

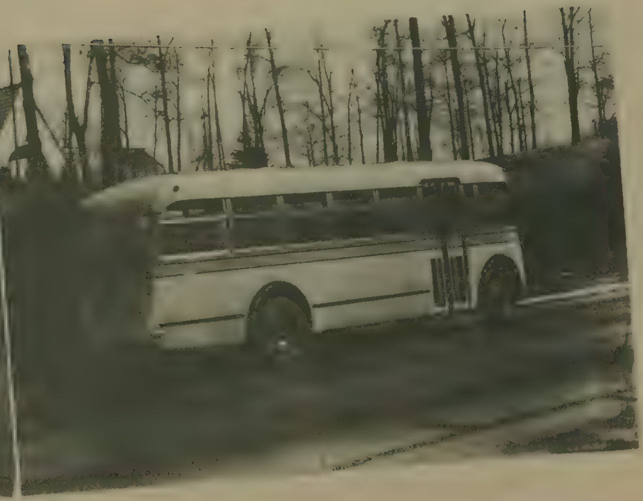
Thomas W. Martin
President 1923—1936

Miss Toccoa Cozart

Along with her distinction of being the first woman passenger to enjoy the adventure of riding the electric cars, she also now has the distinction of being the last woman passenger to ride the last electric street car to run in Montgomery.



Type of Street Railway Equipment Operated in Montgomery at Time of Displacement by Buses



In March, 1936, this type of bus operated by the Montgomery City Lines finally replaced the Street Railway System in Montgomery

The Trolleys of Oldtimerville

By THOMAS E. KLINGE

Meter Superintendent, Alabama Power Company, Montgomery

The Trolleys of Oldtimerville
Our town has seen their last,
Their clanging bells and wheels are still
In dim and dusty past.

Ere we obliterate the track
Of men and things gone by,
Let's make believe we're turning back
What say? Suppose we try.

Let's board a memory car and ride
The Road to Yesterday,
With Father Time to act as guide
Come, let's be on our way.

Ah, there's "King Richard Car-de-line"
The Monarch of the Trams.
He held his court, square, rain or shine,
With many "durnzendams."

And son-in-law, trim Charley Jones,
Too, made his presence felt.
Big hearted, liked, though strong in tones,
Was Ginnavan the Celt.

Here comes with walrus mustache, Platt,
Here's deep voice Bill Perdue,
Though lines would break, though wheels were flat
They saw the whole thing through.

Giles, Overton, and Holiday,
All daily did their part.
Like trolley cars they've gone their way
(Times change—new methods start.)

And Ragland, Major Winters, Scott—
There's Johnny Darling, too.
Some here today—and some are not
Gone—all except a few!

And many an unsung hero bold
On open platforms stood
For eighteen hours, in zero cold
To earn their livelihood.

They brought us, too, some pleasant things,
So simple, yet so fine,
Those summer rides to Pickett Springs,
Bright nights on old Belt Line.

Now back at early nineties gay
Our car comes to a stop,
A German band's about to play
Before we make a hop.

So slow, o'er half a dozen years,
We move by muley steed
To Eighty-six; not minding fears,
The brave fared forth for speed!

But that's 'way back, beyond our touch,
Like distant winky stars.
Will we miss trolleys just as much
As folks did dinky cars?

Well, human nature's just the same
From trolley car to bus,
For some will play the old, old game
With something new to cuss.

Montgomery Street Railway Employees

JANUARY 15, 1936

	Years Service
A. S. Coleman, Div. Manager	15
R. K. Jefferies, Dist. Manager	12
L. J. Gebhard, Ry. Supt.	15
G. B. Welch, Retired	28
W. M. Craven, Dist. Supt.	15
J. T. Alley, Div. Safety Superv.	14

Operators	
L. A. Moseley	22
F. O. Brannon	16
D. B. Owen	25
George Barnes	18
G. W. Stough	13
D. M. Hawkins	10
Elias Reynolds	15
W. M. Shirley	17
M. Eagerton	10
Eric Stephens	16
C. J. Penton	18
T. H. Crossley	17
W. C. Watts	27
N. O. Arnold	19
J. M. White	17
W. H. Mills	9
H. G. Alums	16
C. E. Moseley	9
J. D. James	16
E. L. Alums	13
J. D. Bailey	7
E. A. Shirley	19
W. W. Martin	18
W. S. Aman	14
Harvie Carter	9
W. S. Stough	6
J. R. Askins	10
J. A. Watts	2
F. C. Wright	2
F. E. Deerman	16
S. E. Moseley	2
W. A. Bush	8
E. B. Clark	3
J. S. Reynolds	3
J. L. Raines	10
N. W. Reynolds	11
J. R. Darby	13
J. D. Blocker	16
R. E. Brightwell	9
E. F. Bullard	3
A. M. Courtney	3
F. F. Henderson	8
J. A. Harrod	8
J. C. Davis	6
J. P. Dodgen	17
O. T. Rainwater	9
M. R. Outlaw	7
W. C. Sharp	16
G. O. Brown	12

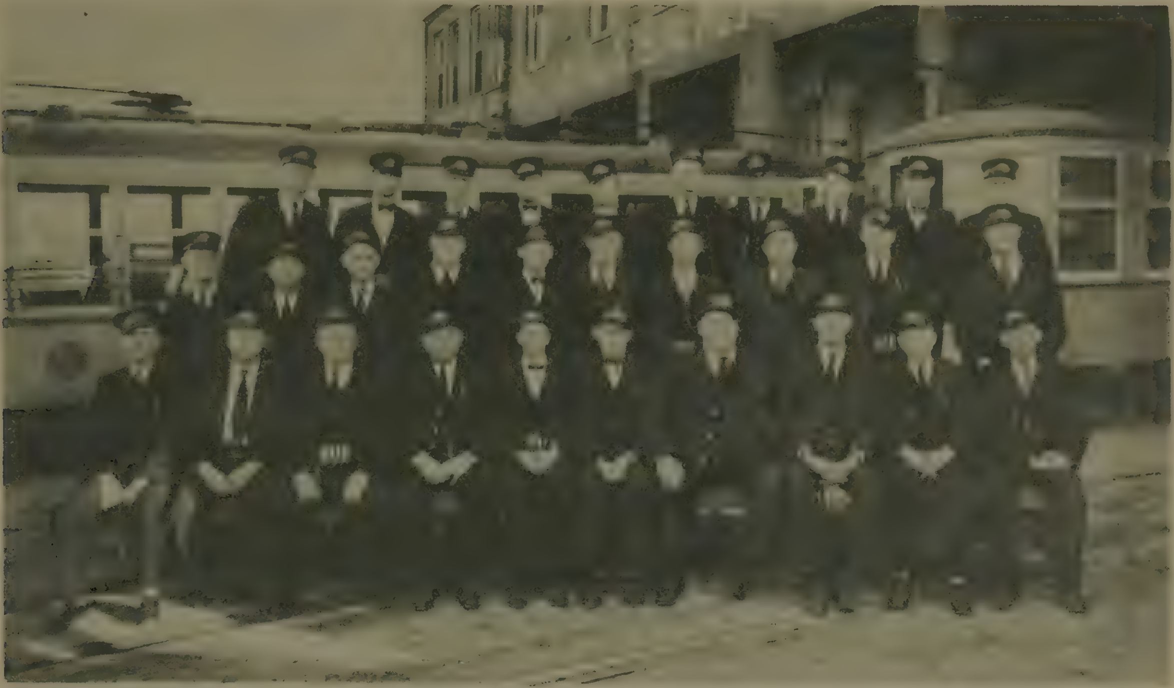
Operators	*Years Service*
J. O. Harrod	2
J. F. Langley	2
C. N. Courtney	2
H. E. Mason	2
J. B. Sadler	1
C. H. Weedon	1
W. S. Allen	1
A. R. Nunn	2
O. O. Martin	2
C. H. Williams	6
W. L. Evans	1
J. M. Wright (Retired)	17
M. E. Vickers (Retired)	16
W. P. Newman (Retired)	33
B. P. Godwin (Retired)	31
O. C. Cone (Retired)	30
P. B. Hudgens (Retired)	16

Inspectors	
J. H. Bagley	13
S. R. Booth	16
W. M. Perdue	30

Miscellaneous	
B. F. Boockholdt	23
T. D. Folsom	6

Track Crew	
A. W. Deavers	12
Cody Cain	5
Lonzie Corbin	11
Obie Davis	1
Charlie Price	13
Flinton Reese	2
George Reed	2
Isaac Washington	2

Car Barn	
H. F. Schuler	11
J. C. Boyd	5
G. E. Frazier	26
N. B. Hufham	10
B. D. Meriweather	8
Ocie Moore	12
E. F. Myers	1
W. A. J. Penton	7
P. H. Rhodes	9
A. T. Ripley	9
L. T. Simpson	2
C. P. Spinks	1
J. C. Sullivan	19
A. H. Tucker	12
A. D. Walker	9
Herbert Dandy	12
Lee Davis	8
John Jackson	13
Julius Jackson	14
J. C. Jackson	31
Sanfus Williams	5

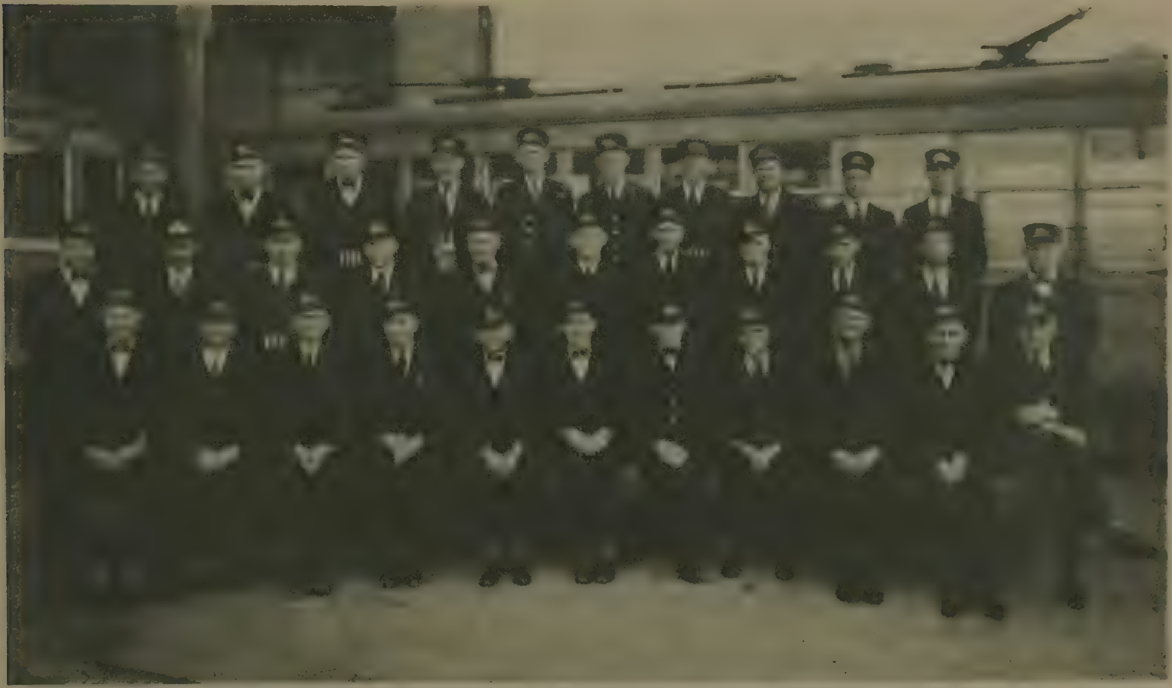


Day Shift of Operators Previous to Complete Displacement of Street Cars by Buses

Front row—Left to Right: C. J. Penton, W. S. Aman, D. B. Owen, H. G. Alums, D. M. Hawkins, J. O. Harrod, E. A. Shirley, George Barnes, E. L. Alums, W. C. Watts.

Second row—Left to Right: T. H. Crossley, F. O. Brannon, G. W. Stough, J. H. Bagley, C. H. Williams, C. H. Weedon, N. O. Arnold, Eric Stephens, A. R. Nunn, W. W. Martin.

Third row—Left to Right: J. D. James, G. O. Brown, W. M. Shirley, C. N. Courtney, Elias Reynolds, H. E. Mason, J. M. White, W. H. Mills, O. O. Martin, Harvie Carter.

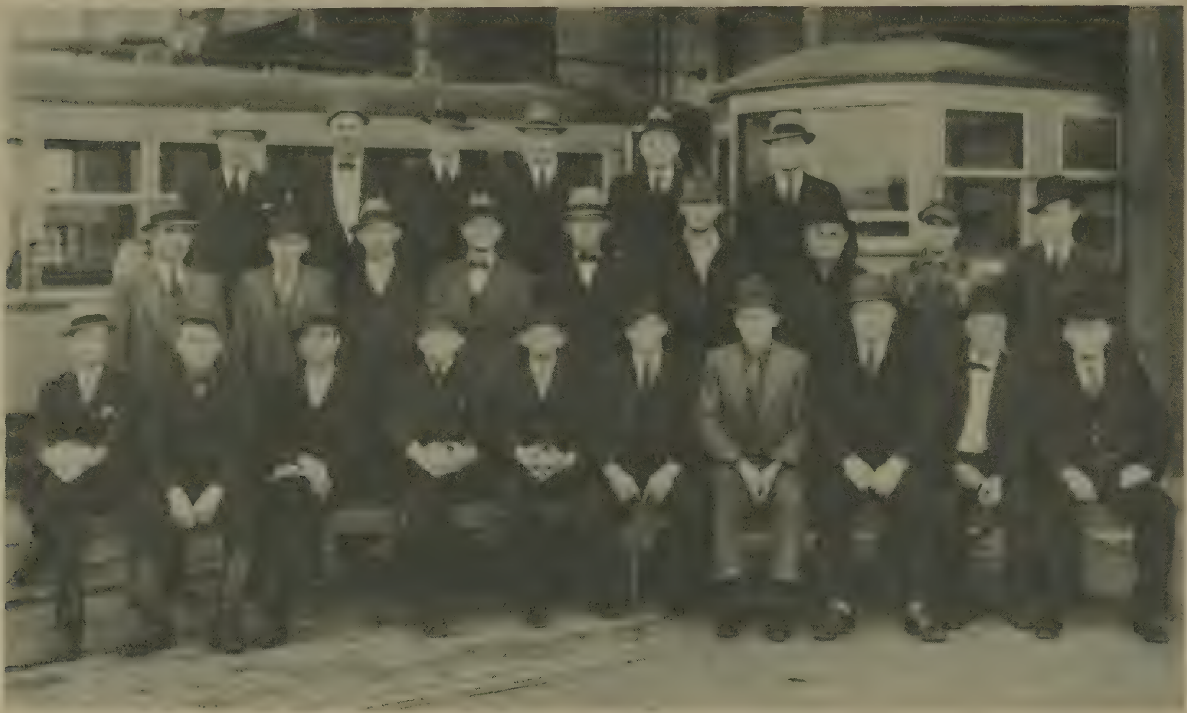


Night Shift of Operators Previous to Complete Displacement of Street Cars by Buses

Front row—Left to Right: A. M. Courtney, J. A. Watts, N. W. Reynolds, E. F. Bullard, F. F. Henderson, M. R. Outlaw, J. P. Dodgen, L. A. Moseley, W. A. Bush, F. C. Wright, C. E. Moseley.

Second row—Left to Right: J. A. Harrod, S. R. Booth, J. L. Raines, J. R. Darby, W. S. Stough, J. C. Davis, J. R. Askins, W. S. Allen, S. E. Moseley, F. E. Deerman, W. C. Sharp.

Third row—Left to Right: J. F. Langley, J. B. Sadler, E. B. Clark, J. D. Bailey, R. E. Brightwell, J. D. Blocker, O. T. Rainwater, J. S. Reynolds, W. L. Evans, W. M. Perdue.

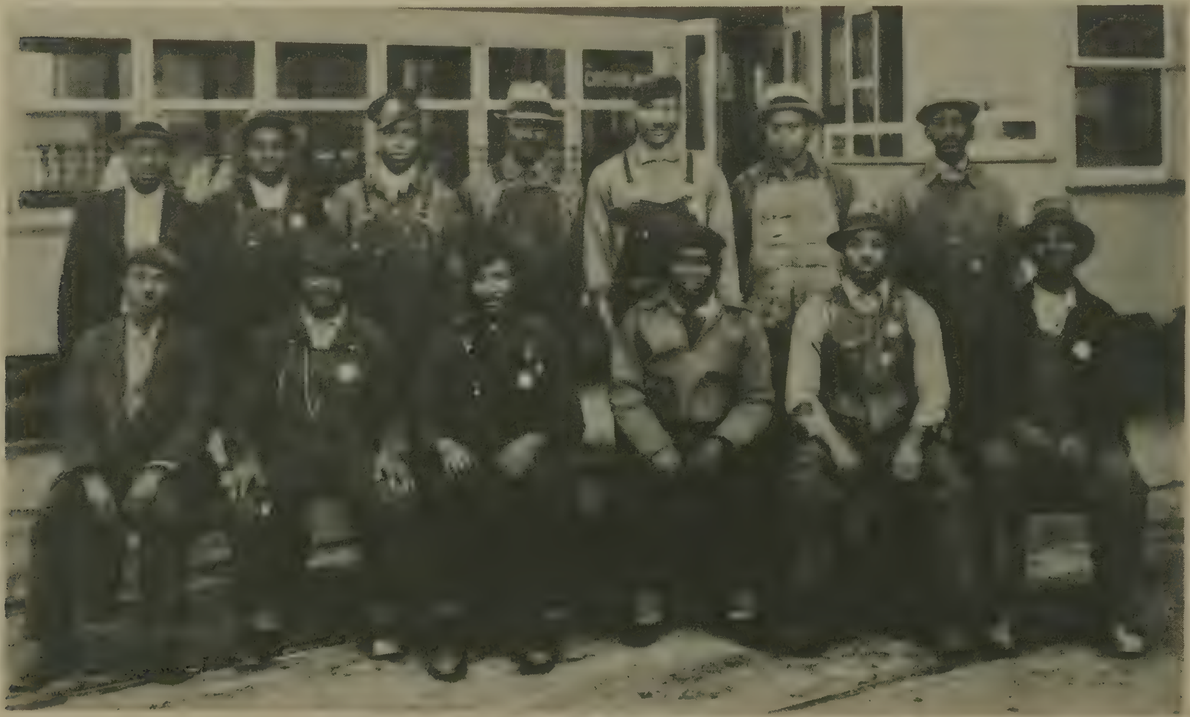


Car Barn Crew and Office, and Supervisory Personnel of the Montgomery Street Railway System before Displacement by Buses

Front row—Left to Right: W. M. Craven, Engineer, G. E. Frazier, N. B. Hufham, H. F. Schuler, Master Mechanic; J. C. Sullivan, E. F. Myers, A. H. Tucker, B. D. Meriweather, B. Y. Carmichael, G. W. Welch (retired).

Second row—Left to Right: J. T. Alley, Safety Supervisor, Ocie Moore, L. T. Simpson, A. T. Ripley, P. H. Rhodes, C. P. Spinks, A. D. Walker, J. C. Boyd, W. A. J. Penton.

Third row—Left to Right: R. K. Jefferies, Operating Manager, A. W. Deavers, T. D. Folsom, B. F. Boockholdt, Cashier, A. S. Coleman, Manager; L. J. Gebhardt, Superintendent.



Negro Employees

Front row—Left to Right: Julius Jackson, Isaac Washington, Sanfus Williams, Lonzie Corbin, Cody Cain, Charlie Price.

Back row—Left to Right: John Jackson, Flinton Reese, Lee Davis, Herbert Dandy, George Reed, Obie Davis Jim C. Jackson.

These pages, reproduced from the August 14, 1886, March 12, 1887, April 30, 1887, issues of the *Electrical World*, an electrical trade journal (still published) describe to its wondering readers, the details of the power plant construction and the operation of the electric cars in Montgomery, Ala.

doux, the chemical expert of the commission, is that it allows the use of natural bitumen, natural rock, asphalt, mastic, or artificial pitch, at the option of the commission, and with conditions as to purity and quality, as to the binding material of the concrete, and requires that the porosity of the sand used and the shrinkage of the pitch or bitumen shall be determined and allowed for before mixture. As to the quality of the binding material the specifications say:

If pitch is used it must be delivered in large lots, and each lot must be shown to conform to the standard. It must not be heated over 325° in distilling or remelting; it must be pliable above 150°, but brittle below that temperature.

If natural bitumen is used it must be absolutely freed from water, and contain in the semi-refined mastic not less than sixty per cent. of pure bitumen.

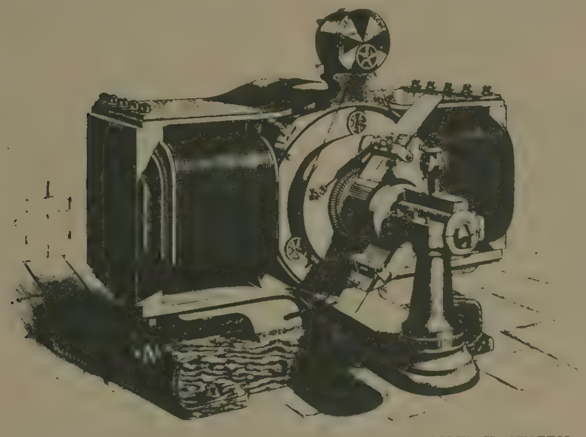


FIG. 1.—GENERATOR VAN DEPOELE ELECTRIC RAILWAY SYSTEM.

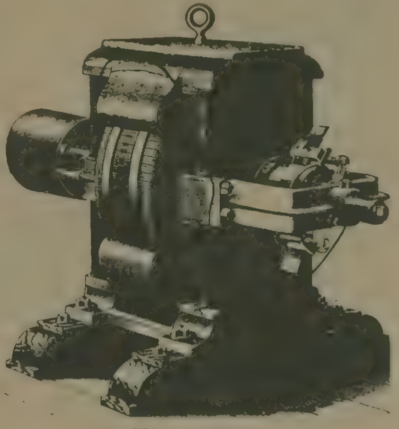


FIG. 2.—MOTOR.

If rock asphalt mastic is used it must be made from natural rock, carrying not less than eight per cent. bitumen and entirely freed from powdered barren rock, and the mastic prepared therefrom should contain such an additional quantity of natural double refined bitumen as will raise the total contents of bitumen up to not less than seventeen per cent.

The first line of subway will extend along Sixth avenue from Twenty-third street to Fifty-ninth street. It makes no provision, however, for electric light wires, but merely for those of telegraphic and telephonic service.

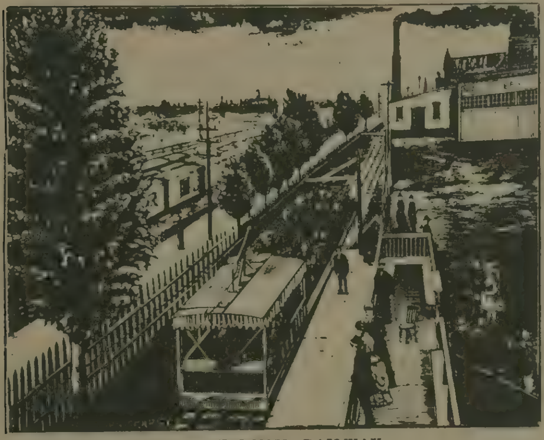


FIG. 3.—TORONTO RAILWAY.

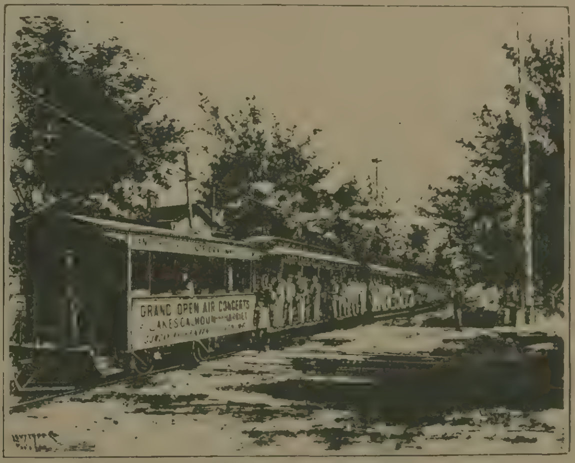


FIG. 4.—MINNEAPOLIS RAILWAY.

Application has been made to the commission for privilege to run wires in the new conduits. So far no effort has been made to test the validity of the acts of the commission

* * *

Pigeon Service.—The latest hobby of Mr. Alfred de Cordova, the well-known broker, is that of carrier pigeons. He is at present enjoying a fortune made on "the street" and is leading a luxurious life at his country seat "Chetolah," near Somerville, N. J. He has instituted a half-hourly dispatch by carrier pigeons between his office on Broad street and Chetolah. The arrival of each bird is signaled by an electric bell in his house, which is connected with the pretty and well-organized pigeon house.

The Van Depoele Electric Railway System.

The Van Depoele electric railway system, now in successful operation at so many places in this country, as well as in Canada, is the invention of Chas. J. Van Depoele, the electrician of the Van Depoele Electric Manufacturing Company, of Chicago, Illinois, and it is the result of constant experiment in generators, motors and the transmission of power, beginning in 1874 and running down to the present time.

The Van Depoele generator, Fig. 1, is a model of simplicity, and several changes have been made from the ordinary Van Depoele dynamo* to adapt it to the work of transmission of power.

The Van Depoele motors are of various sizes and styles, from a motor weighing one pound to the eighty horse-power motor weighing eight thousand pounds. The accompanying cut, Fig. 2, illustrates the large motor for running railway trains.

The first railway operated under the Van Depoele system was laid in Chicago in the winter of 1882-3, and the current was conveyed by a wire. In the fall of the same year a car was run at the Industrial Exposition in Chicago from an overhead wire.

In 1884 a train was run at Toronto, Ontario, by the Van Depoele system, using an underground conduit. This road was operated successfully and carried the passengers from the street car line to the Exposition Grounds, and was a perfect success. It was operated as long as the Exposition lasted. This train averaged 200 passengers per trip; the speed was about thirty miles per hour.

In the fall of 1885, at Toronto, the road connecting the Exposition grounds with the street railway, a distance of one mile, was equipped with a Van Depoele motor (Fig. 3). This train consisted of three cars and a motor-car. As there was only one track, it was necessary to run at a high rate of speed. An overhead wire was used as a conductor, it requiring but a few days to put it in operation; an ordinary forty-light dynamo was used, driven by a Doty 10 × 16 engine.

The average speed of the train was about 30 miles per hour. The trains carried from 225 to 250 people and the average number of passengers per day was over 10,000. The amount of coal consumed was 1,000 pounds per day. This road carried all the passengers that could be gotten on and off the cars.

For the purpose of conducting experiments, a portion of the South Bend Railway line was equipped in the fall of 1885 and several independent cars were run with small motors, the generator being driven by water-power. It was a grand success, the cars traveling in different directions from the same conductor. This road has not yet been equipped, however, owing to change in management.

At New Orleans, during the late exposition, a train, consisting of three large cars, was run successfully until the end of the Exposition.

The Minneapolis, Lyndale & Minnetonka Railway Company, of Minneapolis, have been obliged to discontinue the running of their locomotives in the more thickly settled portions of the city of Minneapolis, and an arrangement was made to bring the cars into the city and deliver them back to the steam locomotives. This is being done successfully (Fig. 4). The motor is located upon a cheaply constructed motor-car and takes the current from an overhead copper wire. The generator is placed quite a distance from the track, and is driven by an old slide-valve engine, 12 × 18 cylinder, making 125 revolutions per minute. The consumption of coal is about 8,000 pounds for seventeen hours' run. Forty-eight trains are run each way daily, running from 6 A. M. to 11:30 P. M. Trains are composed of from three to four closed railway coaches weighing eleven tons each, or of a larger number of open cars weighing six tons each. As many as eight of these cars have been hauled at one time, and this up a grade of 3½ per cent., and the cars crowded to their utmost capacity with passengers, giving a total of 91 tons. The motor works perfectly.

At Montgomery, Ala., the Capital City Street Railway have been running two cars for some time (Figs. 5 and 6). The grades are over seven per cent.: the distance is over 1¼ miles. Motors are placed on the platform of each car and do the work well. The speed over the grade is six miles per hour. The cars run 16 hours per day, and the generator is driven by an old-fashioned slide-valve engine stationed 250 feet from the boiler. The amount of coal consumed per day is 3,000 pounds, including getting up steam from cold water.

---

* The Van Depoele electric lighting system was illustrated and described in THE ELECTRICAL WORLD, September 27, 1884.

At Windsor, Ontario, a train has been running on the track of the Windsor Electric Street Railway Company since June 6, and giving good satisfaction. The distance traveled is about two miles.

The Appleton Electric Railway at Appleton, Wis., is nearly completed and will have five cars run separately. The generator will be run by water-power.

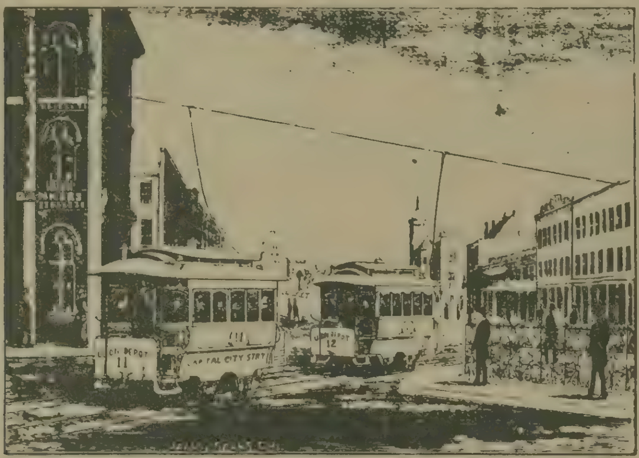


FIG. 5. MONTGOMERY, ALA., ELECTRIC STREET RAILWAY

At Detroit, Mich., the electrical apparatus on the Dix road will all be complete as soon as the track is laid, which will be Aug. 15.

At Scranton, Pa., the Scranton Suburban Railway Company have adopted the Van Depoele system, and the road will be in operation by Oct. 1 next.

The Van Depoele Company have now several contracts in hand to be completed at later dates. As to the competency and durability of the apparatus of the Van Depoele system there should be no further question. It is evidently an established success. Its economy appears also to have been fully demonstrated, and the company have been doing work of a very creditable character. The Van Depoele Company are now making motors for transmission of power, adapted to the Brush, Edison or other systems, and are enlarging their factory to enable them to meet the demand for motors.

◆ ◆ ◆

Transmission of Power in Switzerland.

In a little place called Dorenberg, close to the railway from Lucerne to Berne, in Switzerland, there are an old iron-works and a flour-mill which received water power from a joint canal, having a fall of 33 feet, and yielding 250 h. p. There is also the facility for increasing both the quantity of water and the fall at very slight expenditure by utilizing the River Emme, and thus 400 h. p. might be obtained in future. At present, however, the 250 h. p. alone are utilized by a society which was constituted some time ago in Lucerne, and which has for its object the supply of electric light and motive power to the town and its neighborhood. The motive power is obtained at the mill in Dorenberg, by means of a Girard turbine. Its speed is controlled by a governor, which acts upon a throttle valve, and by a new type of regulator actuated by water power invented by Herr Schrieder. The regulation is so perfect that a sudden drop in the power required of even as much as 100 h. p. only results in a difference of speed of 2 per cent. Of the total 250 h. p., 60 h. p. are transmitted to a distance of nearly two miles, and are to be utilized in an establishment known as the Fluhmühle, near Lucerne. This is done by means of an electric current, conducted along a copper wire of 380 mils diameter, and supported overhead in the usual way on telegraph posts. There is a separate out-and-home circuit. The dynamos and motors for this installation have been supplied by MM. De Meuron & Cuenod, of Geneva, who guarantee a commercial efficiency of 60 per cent. The power required at Dorenberg for this purpose is therefore 100 h. p. At the generating system there are two belt-driven dynamos of the Thury pattern, each of them capable of giving a current of 58 ampères at an electromotive force of 500 volts, when driven at a speed of 400 revolutions per minute. It has six poles and three pairs of brushes. The two generating dynamos are coupled up in series, and thus the E. M. F. of 1,000 volts is obtained. The loss of pressure along the line is about 100 volts, and at the receiving station at Lucerne there are two dynamos, but of somewhat smaller size, which are also coupled in series, and from which the 60 h. p. are obtained. This is the portion of the installation which is devoted entirely to the transmission of power. Another portion of the same installation is devoted to lighting purposes, and consists of two alternating current dynamos of the Zipernowski-Deri type, each capable of delivering a current of 38 ampères at an E. M. F. of 1,800 to 2,000 volts.

These dynamos are driven by spur gear. The conductor is also placed overhead, and consists of four bare copper wires, each 240 mils diameter. Two of these serve for the out, and the other two for the home circuit. The total distance between the dynamos and the lamps is about 3¼ miles. There are seven transformers distributed in the different buildings where the light is required. All the transformers are placed in multiple arc, and each is capable of producing 7,000 watts in the secondary circuit. The pressure at the terminals of that circuit is either 28 or 56 volts, according to the way of using the secondary coils. The total number of lamps now in use is 1,200, consisting partly of 10-candle and partly of 20-candle lamps.

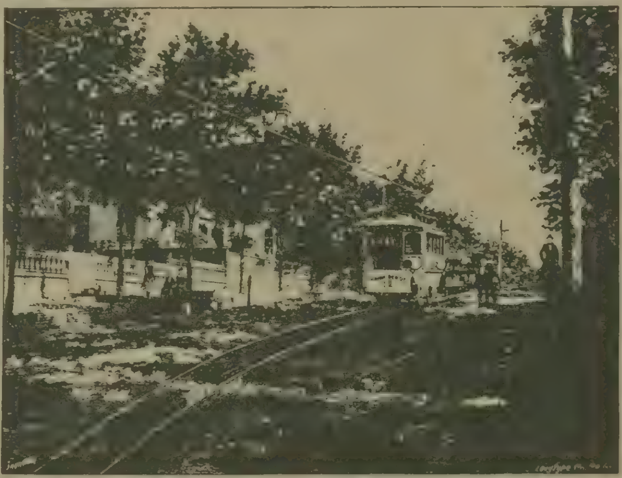


FIG. 6. MONTGOMERY, ALA., ELECTRIC STREET RAILWAY.

◆ ◆ ◆

An Auroral Display in New England.

A remarkable auroral display was witnessed in New England and the northern portion of the Middle States on the 27th ult. It is said to have been the most striking exhibition of the kind since 1882. About 4 P. M. the first effects of a magnetic disturbance were felt, and the most notable results were manifested between 10 and 11 P. M. This appearance of the northern lights was not a surprise, for the sun had for several days before been undergoing a lively struggle within itself. Its spots increased in size and attracted attention. Although daylight, the sensitive telegraphic instruments, even before 4 o'clock, began to show the peculiar disturbing influence which always foretells the appearance of the aurora. The weather was cloudy at the time, but the gradually increasing difficulty in working the wires showed that the magnetic disturbance was growing in intensity. Just before 9 o'clock the heavy thunder clouds that obscured the northern horizon broke away, and the observers who happened to be out got a first view of the celestial pyrotechnics. At first there was a great unbroken arc, stretching from northeast to northwest, over ninety degrees of the horizon being covered by it, and it reached to the zenith. At 9 o'clock the arch was dissipated into innumerable streamers of a beautiful roseate hue. For two hours these streamers danced and flickered. Knots of people stood on the streets in Boston admiring the phenomena. The best view was had from Roxbury.

The climax was reached at 11 o'clock. In the exact north, about two degrees above the horizon, there suddenly shone a point of intense white light. In a few minutes it had spread out into a fan-shaped streamer, reaching far beyond the zenith. It was of such brilliancy that the stars of the Dipper were eclipsed as by a growing dawn. After lasting some ten minutes the streamer contracted to its original small bright spot, which began to spread again in a horizontal direction, running rapidly across the horizontal in two directions, making a beautiful bow, which was followed a few seconds later by a second and smaller one, making distinct arches, from which depended a beautiful fringe of light, giving the appearance of a falling curtain. This exhibition is seldom seen save in the very high latitudes. By midnight the aurora had become only a broad glare, with an occasional streamer flashing across it, which lasted until the dawn of day.

The effect upon the wires was quite serious. All the telegraph companies report the electrical storm the severest northeast of Boston, through Maine toward the maritime provinces. The Western Union was almost shut out from that region between 7 and 10 o'clock, while to the west the effect was hardly noticed. Even upon such local circuits as the district messenger and telephone service there was much trouble. Many call boxes where the current was weak were rendered temporarily useless, and several districts of the telephone service were cut off from the city. Toward Woburn the telephones could not be worked for several hours, and in the city a large number of individual instruments were out of circuit. After 11 o'clock the troubles began to decrease.

◆ ◆ ◆

Swift's Snow-Storm.

"Talking about the signal service and its bad luck in the weather-prophesying business," said a station agent, "let me tell you a little story about Swift, superintendent of telegraph on the Rock Island. Some time last winter the signal service people told Swift they would furnish him their bulletins if he would undertake to send them out and have them posted along the road. Swift accepted the offer, and thought it a big thing. He had instructions sent out to all operators concerning posting of the weather bulletins, and felt so proud of the new service that he went around bragging what a good thing it would be. In a few days the signal service predicted a very heavy snow-storm, and Swift sent word to the superintendents suggesting that they had better make arrangements in advance to keep the tracks clear of the unusual fall of a snow sure to come.

"'Now, you see,' he said, 'how valuable this service is to a railroad. When that snow comes we'll be prepared for it and not a wheel will be stopped.'

"Instructions were sent out to station agents and section bosses, and in some places gangs of extra laborers were hired to shovel snow. But the snow-storm didn't seem to be in a hurry. The day passed as bright and clear as one could ask for; the night following was equally as pleasant and the next day started in as clear as a morning in June, with no sign of snow to be discerned.

Intermittent Current Telephone Transmitters.

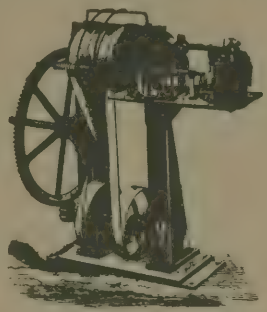
BY JOHN E. DANN AND J. LAPP.

In nearly every experiment made to test the value of the Bourseul and Reis method, the cubical box transmitter, or some invention of recent date, was used, and because of the failure of these instruments to transmit perfectly the public generally have come to the conclusion that the intermittent current cannot transmit speech. It would appear that Reis' object was not to give the public a speaking telephone, but to publish to the scientific world the fact that sounds could be transmitted electrically, he supposing the telegraph to be ample for the needs of modern life; and although he had good articulating telephones, so delicate was their adjustment and so unreliable, that in placing his telephone in the hands of scientific people he preferred to give them an instrument that could not get out of adjustment. Therefore, he gave them his cubical box transmitter.

It is absurd to say, in the face of statements made by his contemporaries, that he could not, or did not, transmit articulate speech. We have tried many experiments with the cubical box transmitter, with the instrument described by Legat—a Reis—and the instrument described by Charles Bourseul. We find that when the cubical box is used exactly as described by Reis, viz., as a make and break, and spoken to loudly, so that the vibrations of the electrodes can be plainly heard, and an amount of battery used that will not arc across the gap, then it transmits so that nearly all can be understood. With the lever instrument, adjusted so as to make and break when the vibrations strike the diaphragm, no trouble is experienced in carrying on long conversations. With the Bourseul instrument, the transmission is very good. We have experienced the same difficulty that no doubt they had in keeping the instruments in the proper adjustment, that they would make and break the circuit by the vibrations of the diaphragm, and this trouble is unquestionably the reason why Reis did not put his lever telephone in the hands of inexperienced persons, although it was a *speaking* telephone.

We were led to these experiments by having constructed an intermittent current transmitter. There is some difference of opinion as to what an intermittent current transmitter is. Some have tried to establish that a certain transmitter was such, where the only evidence they could bring was an extremely fine-drawn theory, and the instrument in question did not differ from what are acknowledged to be undulatory current instruments. All fair-minded men acknowledge that a make and break should be loud, and have the same evidence of its make and break character that the Reis has, viz., a buzzing sound made by the electrodes. The chief counsel of the American Bell Telephone Company, Mr. Storrow, said in a brief submitted to Mr. Lamar last winter that, "if a make and break could be made it should be heard at least two feet from the receiver, whereas the best undulatory cannot be heard six inches from the receiver." Our instruments corroborate the statement of this gentleman, for when using one cell of Leclanché battery over an ordinary No. 12 iron wire, grounded and one-quarter of a mile in length, speech can be heard eight or twelve feet away, and understood perfectly. There are no foreign sounds whatever, and many of the words were understood twenty feet from the receiver in a quiet room. In our transmitter there exists the same evidence of its make and break character that exists in the Reis, viz., the buzzing sound heard by a person standing near the transmitter, caused by the motion of the electrodes.

The faults of the Bourseul and Reis instruments are the difficulty of maintaining adjustment; and the fact that the parts of the instrument themselves after a short time acquire motion, and thus open and close the circuit and send to line currents where there is no corresponding air vibration. Many of the foreign sounds heard in the receiving instrument arise from this cause. But the chief trouble in the use of these instruments now arises from the desire of the parties using them to use the Bell method. Having no faith in the Reis intermittent current, they assert that Reis never intended to use it; they speak gently, so as not to break the current, or, if compelled to speak louder, they again avoid the issue by using battery, so that the current will arc across the gap made by the parting. They hope to get the Bell undulatory current, forgetting that the current crosses the gap as a series of throbs or sparks. Each of these being heard in the receiving instrument, drowns out all articulation and gives it the toy trumpet tone complained of.


ELECTRIC GOVERNOR FOR WATER-WHEELS.

All that is required to transmit sound electrically is to send to line currents of electricity that correspond in number and intensity to the air vibrations of the sound, and it is quite immaterial whether the current is undulatory or intermittent; though any electrican will understand that, if the current is intermittent it is a long-distance and loud-speaking telephone. To accomplish what some are pleased to term an impossible feat, all that is necessary is to so construct the apparatus that the air vibrations striking the diaphragm can cause a separation of the electrodes; and to so arrange the apparatus that whether the extent of the air vibration be great or small, the blow struck by the diaphragm electrode on the second electrode shall be in proportion to the air vibration; and that the blow be received in such a manner that the second electrode will not be set in vibration, as every blow not represented by an air vibration causes a foreign sound to be heard in the receiver.

When we consider the force of the air vibrations, and the conditions necessary for a practical make and break transmitter, it is not strange that inventors prefer to make varying contact transmitters, or that the world has long thought a make and break an impossibility.

The separation of electrodes has been established in many ways; one of these was auricular. A test was made, however, that was mathematical in its certainty and fully showed that the separation broke the current. Electricians and others who have examined this instrument testify that so far from the method of Reis and Bourseul being worthless, it is the correct method, giving better articulation, and the method producing a long-distance telephone. As regards articulation, fractions and unusual names are readily understood by persons unaccustomed to the use of telephones.

◆

An Electric Water-Wheel Governor.

The regulation of dynamos can be effected in various ways, one of the most simple of which is the varying of the speed of the armature to correspond with the electrical load. A governor designed for this purpose and adapted to be attached to water-wheels, has been constructed by the Globe Iron and Electric Engineering Works of Chicago, and is shown in the accompanying illustration. The current from the machine passes into two large coils, to one of which is attached an armature, which works two small friction wheels that run in opposite directions, power being obtained by a belt from the countershaft, which runs on a pulley, with another pulley on either side. When, by the turning out of a light, the current becomes too strong, the armature is drawn down, pressing one of the friction wheels against a larger wheel. The latter then operates a cog wheel, which moves a bar that slides the belt on to one of the side pulleys. This is connected with a gearing and partially closes the gates on the wheel.

As the power diminishes, the current grows weaker, until it again attains its normal strength. The armature is then no longer attracted, and the friction wheels, being no longer attracted, the motion of the shifting belt ceases after reducing the speed to the proper point. When a light is switched into the circuit, the armature is drawn in the opposite direction, which brings the other friction wheel into action and increases the speed of the dynamo correspondingly. An attachment to the governor consists of a coil which is so arranged that if the circuit is broken a lever is released, which, working on a fulcrum, holds the armature down and the water is entirely shut off the wheel, thus stopping the machine.

◆

The Montgomery, Ala., Electric Railway.

The Capital City Electric Railway of Montgomery, Ala., which commenced running its street cars by the Van Depoele electric railway system one year ago, is now equipping its road with the most complete and extensive electric railway outfit in the world. The total length of track being equipped is over eleven miles. The accompanying diagram shows the lines of the road. It will be easily understood by any one familiar with the city.

There are four lines of road, the cars all starting from the same point, which is at the end of the double track on Commerce street near the railroad depot.

The Court street line runs up Commerce street, turning at Fountain square, up Court street to Grove, up Grove to Hill, up Hill street as far as Scott street. This is the line which has been run by electricity for the past year. The length of track is 2¼ miles. Four cars are used. The grades run up to 7 per cent

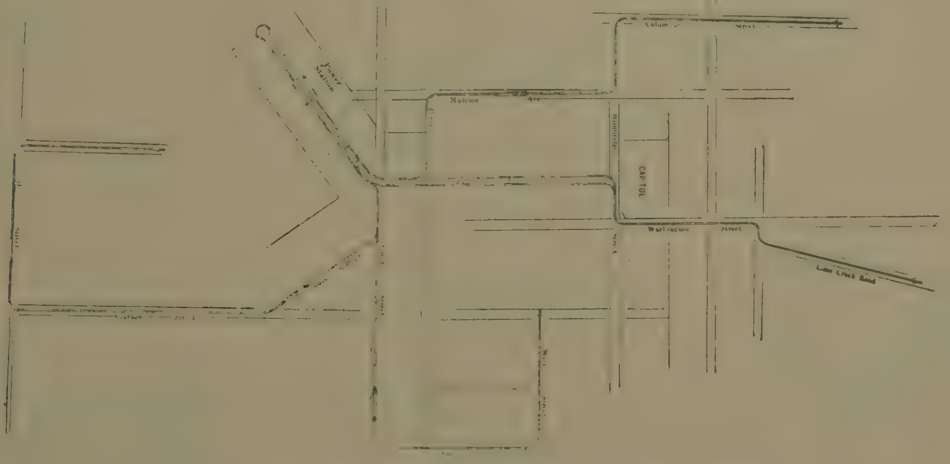
The Dexter avenue cars run up Commerce to Fountain square, then up Dexter avenue to the State Capitol, then on Brainbridge, Washington and Union to the Park, 3¼ miles; 8 cars.

The Madison street line runs up Commerce to Fountain Square, up Dexter avenue and Perry street to Madison; on Madison, Bainbridge and Columbus to the Cemetery, 1¾ miles, and has 3 cars.

The Clayton street line runs on Commerce, Court, Church and Clayton to Holt, one branch turning up Aaron street and ending at the Mobilo; 2¼ miles and 4 cars.

At Fountain square all the cars diverge in three different directions from the main track, thus making Commerce street the main trunk, with four branches.

Any practical street railway man can see the difficulty of



PLAN OF THE MONTGOMERY, ALA., ELECTRIC RAILWAY ROUTES.

making these switches in track and electrical conductors, all the cars having to cross other tracks before they go back to the starting point or power station.

The power station is situated near the end of the track on Commerce street, where on a valuable piece of real estate in the heart of the city has been erected for this especial purpose a handsome and permanent brick building three stories high and 70 by 100 feet. The lower floor is occupied by offices, engine and dynamo room, boiler room and car room; the second floor will be used for offices and repair room, and the third as occasion requires.

The steam power consists of two batteries of steel boilers of 240 horse-power each capacity; two Porter-Allen engines of 120 horse-power each, with all modern improvements, as to heaters, pumps, steam gauges, etc. The engines are connected to a main shaft, and friction-clutch pulleys are used throughout wherever they may be needed.

The electrical outfit consists of a 240 h. p. dynamo, with many new appliances. This dynamo is of an entirely new construction, made especially for railway work. Mr. Van Depoele, of the Van Depoele Company, has been working some five years upon this invention. The dynamo weighs about fourteen tons, and is made to run at slow speed. The motors are of the new Van Depoele pattern, and are placed upon the front platform of the cars. They are easily managed. Some are placed on the old cars, and some will be attached to the new cars being made by Brill & Co., of Philadelphia. The conductors are overhead wires, the same as are used at Appleton, Detroit, Port Huron and Scranton. The electrical outfit to complete this plant was ordered after almost one year's experience with the Van Depoele system. Every objection to the electric railway system has been thoroughly canvassed and carefully considered. The whole equipment will be completed in April.

The officers of the company are: E. B Joseph, president; Taylor Roberts, secretary; J. A. Gaboury, manager; F. E. Gaboury, superintendent, and Thos. E. Hannon, treasurer.

Mr. J. A. Gaboury, the manager, is a large stockholder, and although busy in perfecting and introducing his new cotton compress, has taken time to thoroughly investigate this subject. To his enterprise is largely due the carrying out of this great work, which will be a credit to the growing city of Montgomery.

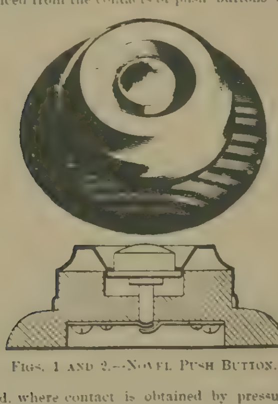
Like all cities in which electric railroads have been adopted, Montgomery is experiencing a boom in business, and real estate is so rapidly advancing in value as to astonish the old natives who predicted the failure of the attempt to "run the mule cars by lightning."

The spirit of progress is abroad in the Southland; its handmaid is electricity, and the "old fogies" must wake up or sleep on forever. Montgomery leads the van, and other Southern cities are soon to follow. It is, in fact, a most striking evidence of the new spirit of enterprise in the South that so much of the new electric lighting and new electric street railway business is being done there.

◆

An Improved Push Button.

In damp and dusty situations, much inconvenience is experienced from the contacts of push buttons becoming corroded, where contact is obtained by pressure alone. To avoid this difficulty, the Electric Gas Lighting Company, of Boston, have recently designed the push button shown in the accompanying illustration, Fig 1. The push shown in section in Fig. 2 consists of two spring strips which overlap each other, and, when pressed by the button, are deflected and rub against each other. In this way the contact is always kept bright and clean. The button, made in imitation of amber, is held in position by a nickeled cap and the whole presents a very neat appearance.



Figs. 1 and 2.—Novel Push Button.

◆

Disintegration of Converters.—A correspondent, "F.," writes as follows: "In your issue of Feb. 26, Mr. Carl Hering states that the coil of the Zipernowsky-Deri converters will 'disintegrate quickly.' Why will it disintegrate? Is it the copper wire, the iron, the insulation, or what is it that will disintegrate? Why will it disintegrate more rapidly than the Gaulard & Gibbs converter?"

Some Practical Questions in Magnetism.

The following remarks were made in the discussion of the paper read by Mr. T. Wolcott on the above subject, at the last meeting of the Electrical Section of the American Institute, and printed in our issue of March 5:

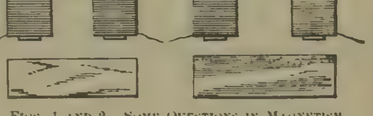
Mr. C. S. Bradley: I wish to present what seems to me a new view of the action in electro-magnets which, with Mr. F. B. Crocker's assistance, I have arrived at.

My first proposition is, that a certain magnetic potential is set up by every ampère-foot of wire, whether adjacent to iron or not.

We are all well aware of the production of currents in adjacent parallel wires when a current is started or stopped in any given conductor, and I attribute this to magnetization, so that an experiment is unnecessary to illustrate it. We often hear that the magnetic effect is due to the number of ampère turns, and this is right within certain limits when the diameter of core remains the same, but when the area of cross-section in the core is changed, the magnetism is no longer proportional to the ampère turns but proportional to the ampère-feet. It appears absurd that one turn of wire, carrying one ampère, around a core ten inches in diameter, should have the same magnetic effect as a turn of wire carrying one ampère around a core one inch in diameter.

By ampère-foot I mean a foot of wire carrying one ampère of current, and on electro-magnets the length calculated as if the wire was all wound close to the core that is, the difference in length between the outer layers and the ones nearest the core must be deducted from the total.

To produce a good result not quite up to saturation in very good wrought iron, it is necessary to have about 500 ampère-feet to every square inch of core area. This includes both limbs of the magnet, and from a number of examples, one of which is the little ¼ h. p. motor of the C. & C. Company, another, the fifty h. p. dynamo of Hopkinson and several other makes, we find this to hold true.



Figs. 1 and 2.—Some Questions in Magnetism.

The electrical energy consumed per ampère-foot is dependent upon the resistance or cross-section of the wire used, and in very large cores, where increased cross-section of wire does not so rapidly lengthen the outer convolutions, it would seem possible to maintain the magnetism with infinitely small expenditure of current, which suggets to us that magnetism once made is a static effect as we see it in a steel magnet.

To make the use of the unit (ampère-foot) plainer, let us take, for example, a core twelve inches in circumference. Then we have approximately twelve square inches cross section. With five hundred ampère-feet per square inch this would call for 500 × 12, or six thousand ampère-feet on both limbs of the magnet; and if our wire carry five ampères then it would be $\frac{6000}{5} = 1{,}200$ feet long, provided the winding could coincide with the circumference of the core; or, in other words, there would be twelve hundred (1,200) convolutions.

The total length depends upon the thickness of winding, and this, in turn, depends upon the size of the wire and the length of cores. But as these demand separate treatment, we have not time for their discussion.

Admitting that an ampère of current through a foot of wire produces a certain magnetic potential, whose lines of force cannot be annihilated but may be scattered, and not carried where the work is to be done, then, having once obtained our magnetic potential or magneto-motive force, it is only necessary to furnish a proper magnetic circuit to direct the lines of force to the place where the work is to be done. And now I want to invite your criticism to a seeming exception to the proposed law of magnetic circuits corresponding to Ohm's law for electrical circuits.

In the illustrations, Fig. 1 represents a short, thick magnet, and Fig. 2 a longer magnet of similar cross section.

In Fig. 1 the lines of force would not be perceptibly scattered. In Fig. 2 the magneto-motive force would be higher, owing to there being more wire upon the cores, and consequently more scattering of the lines of force, and especially more lost between the limbs of the magnet. Therefore, in order to utilize the lines of force to the best advantage it would be necessary to make the air space less than in Fig. 1, or, in other words, place the armature closer. But in electrical circuits we make the internal resistance bear a certain relation to the external, and in order to compare the magnetic circuit let us call the iron portion the internal and the air space the external resistance. Then we have a greater internal resistance in Fig. 2 than in Fig. 1; consequently we should have a greater external resistance, which means that the armature should be moved farther away, making the air space more instead of less, as is the case when we wish to reduce the scattering lines of force

◆

The Effects of a Blizzard. The following is said to have been noticed during a blizzard at Cando, Dak., last month: "The wind coming from the west, impinged with great force upon the west front of the county building, passed along the north and south sides, and formed an eddy at the east side. The friction, in passing the northeast and southeast corners was so great as to generate electricity in the apartments in the east end of the second story of the building, highly charging every object in the rooms. The electricity was so strong that personal contact between the occupants produced a perceptible shock. When a Dakota blizzard develops lightning in mid winter with the mercury below zero, some idea may be formed of its tremendous power."

Portable Electric Shot Firing Apparatus.

BY W. E. IRISH.

The application of electricity by civil and military engineers to the firing of mines and to blasting purposes generally in the quarry, mine and for the removal of obstructions has been found of such great value that few such men, knowing their profession and working in earnest at it, can afford to be without an electric-firing outfit. Some objections against its more general use have, however, been raised by one or two of the old-fashioned time-fuse men who have unsuccessfully tried to show that the firing of shots by electricity is more costly than by the unreliable and very dangerous time or slow-match fuse; and that the parts and connecting wires are so complicated and confusing that no person can handle or operate the apparatus with safety, unless he has a thorough electrical knowledge.

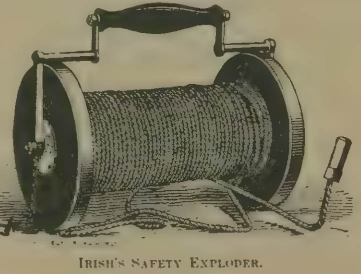
These assertions about the electrical apparatus are simply due to a want of knowledge on the part of its adversaries, as all engineers having practical experience with the two methods know full well that the electric, whether employing the dynamic exploder, the frictional machine, or the portable electric shot-firing apparatus, is much less costly, more handy, safe, and reliable than the other, and that a shot can be prepared and fired by means of electricity in a fractional part of the time occupied in preparing and firing the same by a time fuse. The gain by the saving of time in one operation alone, where many men are engaged, will more than defray the entire cost of a complete outfit which would fire without additional outlay hundreds of other shots. Where blasting operations are frequent, the saving is very considerable, and the risks incidental thereto are reduced to a minimum.

The second objection is, as the first, quite imaginary; but to meet the objections according to their weight, the little apparatus here illustrated and described, was specially designed by the writer. It consists of a wooden reel containing on the inside of the core a small cylindrical dry battery, an induction coil, and a condenser.

The battery will last twelve months, working daily, and when exhausted is withdrawn and another inserted in its place, as a cartridge would be in a breech-loading fire-arm, the operation taking no longer to perform in one than in the other. On the outside of the core and between the checks of the reel is wound an insulated double flexible conductor of any desired length; one end of this is connected semi-permanently to two insulated terminals which are permanently connected with the battery, induction coil and condenser through a switch arrangement at one end of the reel, the other end of the conductor being attached to the fuse.

On the fuse being placed in the charge ready to fire, the reel, which freely revolves in its bearings, is conveyed to a safe and convenient distance from the scene of the explosion, the wire paying itself off the reel by its own weight as the apparatus is carried by the handle. When all is ready to fire the shot, the plug or switch-key is inserted in the hole in the end of the reel and given one turn, thereby closing the electrical circuit and firing the fuse and charge. The switch is so arranged that on the key being depressed and turned to fire the charge, it locks the contacts in such a manner as to prevent the circuit being again closed without first withdrawing the key, inverting it and unlocking the mechanism. This locking contrivance is designed to prevent the possibility of a charge being fired by accident.

When a new fuse has been attached to the conductors, and the necessary unlocking operation performed, the apparatus is again ready to effect another explosion. The conductor is rewound by causing the reel to revolve by friction of the hand against one of its ends, or by means of a crank-handle not shown in the illustration. This apparatus has the advantage of being self-contained, always ready in all weathers, subject to no hanging or missfiring, and well able to withstand rough usage. From one to four shots in continuous circuit can be fired simultaneously, and a greater number of charges can be exploded in such rapid succession as to be practically simultaneous.



Irish's Safety Exploder.

◆

Fire in East Boston.—A fire occurred last week in the old wooden building in East Boston occupied by the Citizens' Electric Light Company. The loss on the building will amount to about $1,200, and several of the dynamos were injured. The cause of the fire is unknown. The fire did not interfere with the lighting of the streets, which went on as usual.

The Van Depoele Generator for the Montgomery (Ala.) Electric Railway.

The electric railway at Montgomery, Ala., which will soon be put in operation is without doubt the largest undertaking of the kind thus far attempted. The initial plant consists of 14 cars equipped with 10 h. p. motors and 4 cars with 20 h. p. motors. The style of car and method of connecting motor is shown in Fig. 2. These motors will be run on different roads and as the grades are long and steep, rising to 7 and 7½ per cent., the heavier motors were deemed necessary on some cars. To operate these cars a single large generator has been installed capable of delivering 250 h. p. to the motors, and thus having a surplus of 30 h. p. even when the motors are all doing their maximum work at the same time—a very unlikely condition of working. On an ordinary level the dynamo would evidently be able to drive the motors of thirty or forty street cars. The "Giant" dynamo which is illustrated in the accompanying engraving, Fig. 1, has an iron base 9 feet long and stands 53 inches high. It is 7 feet wide, measuring from one bed to the extremity of the other, and the pulley projects another 14 inches, the latter being 3 feet in diameter. The field magnets are 2 × 3 × 2 feet, and the armature is 3 feet 4 inches long and 28 inches in diameter. With only three ampères in the field and running at only 350 revolutions per minute, the machine gives 450 ampères at 500 volts.

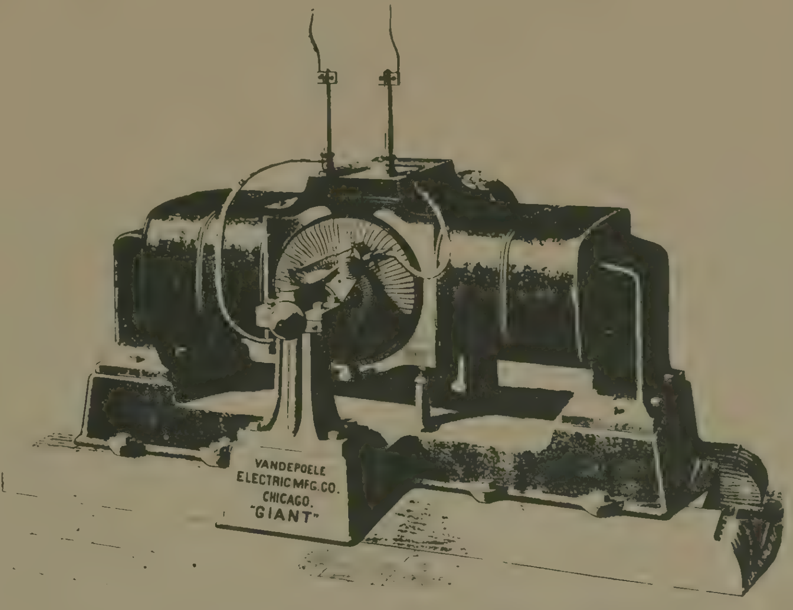


FIG. 1.—VAN DEPOELE GENERATOR, ELECTRIC RAILWAY, MONTGOMERY, ALA.

In addition to the generator for the street railway service, there is in the same station a 60-light arc machine, which will be used for lighting Rose Hill Park. The machines stand side by side, the current of one being used for power and that of the other for light.

The power to drive the electric apparatus consists of two 150 h. p. Porter-Allen high-speed engines, and the latter are so arranged that either one or the other can be thrown off at pleasure, as, for instance, on days when travel is light. The whole plant in Montgomery, track cars, steam and electric power, will be made a model in every respect. When all is in operation (which will be within two or three weeks) this will be the largest electric railway plant in the world.

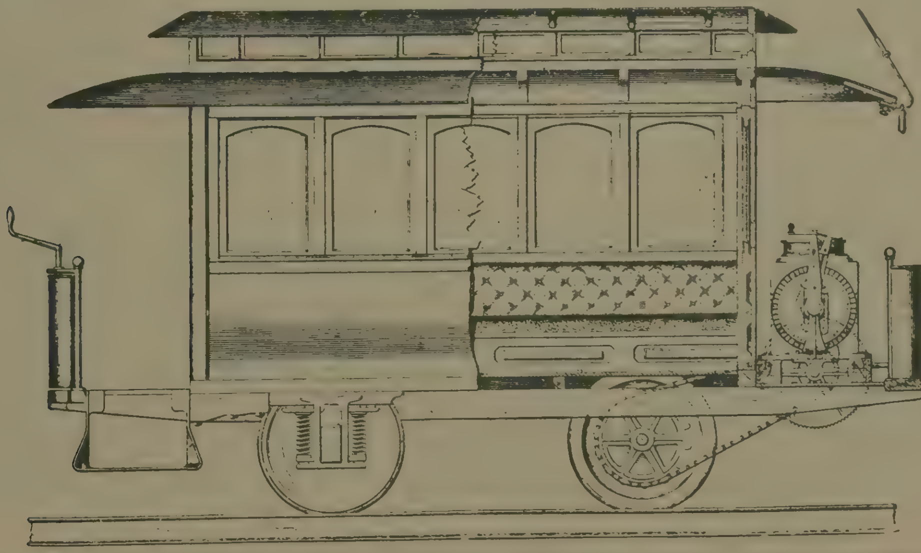


FIG. 2.—METHOD OF ATTACHING MOTOR TO CAR, VAN DEPOELE ELECTRIC RAILWAY SYSTEM, MONTGOMERY, ALA.

New York Subways.

The following is part of a communication addressed to the New York Legislature signed by Mayor Hewitt and the heads of the various departments of the city government:

The short time during which the Legislature may remain in session will perhaps make it difficult to give effect to all the recommendations heretofore submitted; but there are four measures now pending, either in committee or before your honorable bodies, which seem to us to require prompt and decisive action, in order that the interests of the city may not be imperiled or sacrificed.

The first of these is what is known as the Subway Commission bill. There is a substantial unanimity of opinion in this city that the telegraphic wires should be placed under ground and the unsightly poles removed from our thoroughfares. For the accomplishment of this object, however, there never was and there is not now the slightest necessity for the formation of a commission. The city authorities are perfectly competent to attend to this work if they are invested with the proper authority. The commission has been and is a useless and expensive obstruction to the execution of the work. But as it was imposed upon the city by the Legislature, and has organized a subordinate but illegal agency for the execution of its plans, whereby the whole enterprise has become complicated with private interests, demanding and perhaps entitled to consideration, the Mayor arranged a compromise measure by which the rights of private parties were respected and the interests of the city duly guarded and protected. This measure of settlement contemplated the continuance of the commission for two years beyond the expiration of its present term of office, but secured the ultimate control of the work to the City Government. This concession was agreed to upon the distinct understanding that the city should have three representatives upon the extended commission, thus securing the power to veto any improvident or otherwise objectionable arrangement. Upon any terms less safe for the city it would be far better that the commission should die a natural death and the work be suspended until it can be freed from the entanglements in which it has been involved by the action of the commission. We learn now with surprise and indignation that the commission is insisting upon an additional year of its useless and expensive existence, and in order to have unlimited control has caused to be omitted the names of two of the three public officers whose addition to the commission alone made its continuance tolerable. Against this proposition we protest in behalf of the city, and considering that the old commission has shown itself so insensible to the generosity of the compromise proposed by the Mayor, we respectfully urge upon the Legislature to strike from the compromise bill all provisions looking to the continuance of the commission, so that its powers will at once be transferred to the Commissioners of the Sinking Fund, where it is intended that they shall ultimately reside.

◆

The Induction Space.

To the Editor of The Electrical World:

SIR: Among the many suggestions for the unnamed space in a dynamo, please allow me to offer the words "induction space."

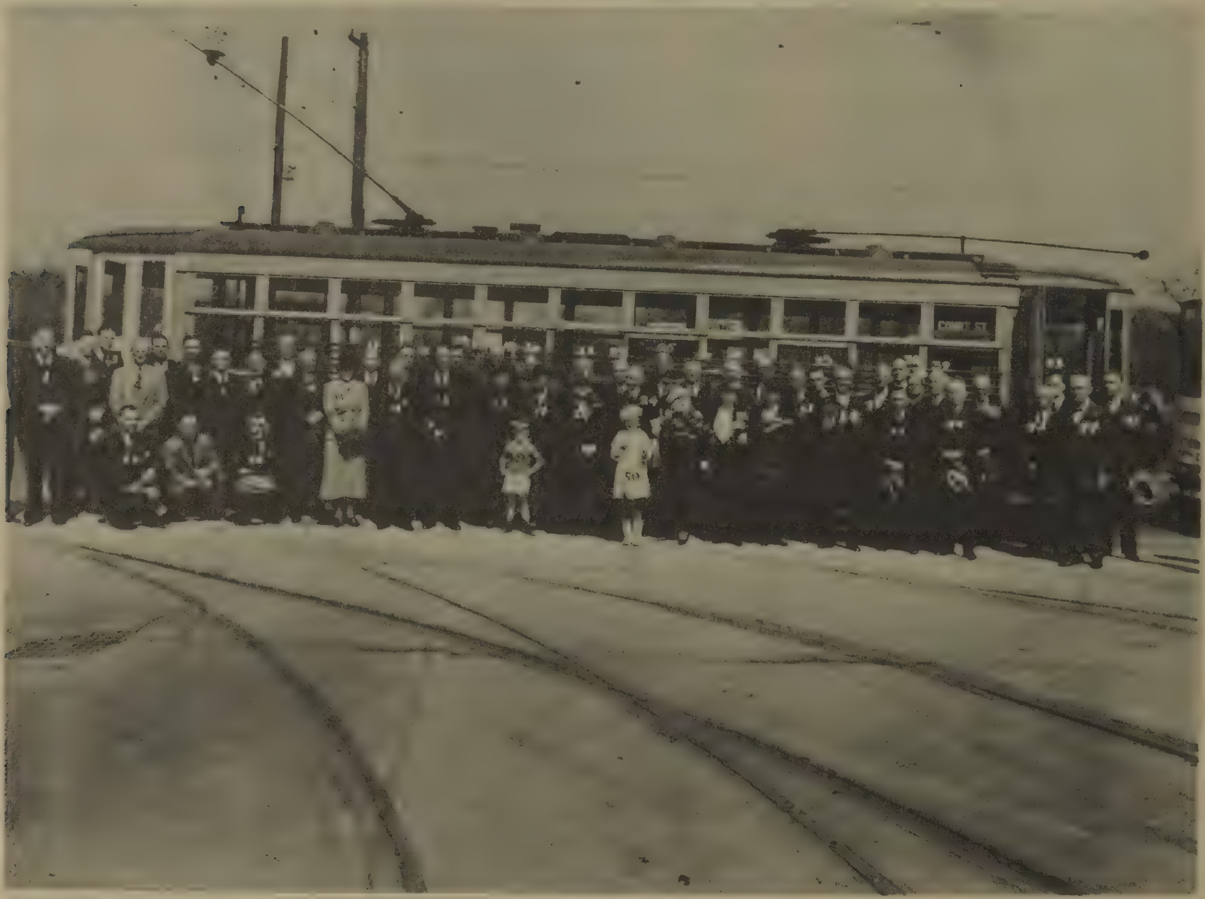
CARBONDALE, Pa. H. H. H.

Finis

At 10 a.m. Sunday, March 8, 1936, the electric street car passed from the life of Montgomery. According to the *Montgomery Advertiser* of March 9th "more than 2,500 citizens with mingled emotions assembled at Court Square to watch the passing of the electric trolley car in Montgomery.

"Street car service really stopped here at midnight Saturday, except on the Court line and when the two big 'ceremonial cars' moved from the Square at 10:15 a.m., motor buses were already rolling through the city.

"From 7 to 10 a.m. two of the finest street cars in Montgomery gave free service to any who cared to ride the Court Street line. At 10 a.m. they came to a stop on Court Square and were filled with old-timers, (some of whom rode the original 'Lightning-Route' cars), officials



The Passengers on the Last Electric Street Car (No. 204) Operated in Montgomery, Sunday, March 8, 1936.

1. B. F. Boockholdt, 2. J. C. Haas, 2nd., 3. Otis Boockholdt, 4. A. M. Haas, 5. Junius B. Smith, 6. Mark Johnston, 7. Robert Hugger, 8. M. W. O'Dwyer, 9. P. M. Ryan, 10. J. M. Billing, 11. Mrs. E. W. Robinson, 12. Warren S. Reese, Sr., 13. Water Bragg Smith, 14. W. C. Watts (operator), 15. W. M. Perdue, 16. Col. W. A. Gayle, 17. Mrs. T. W. Martin, 18. Judge Walter B. Jones, 19. Mrs. O. K. Seyforth, 20 Thos. G. Jones, 21. Mrs. J. A. Gaboury, 22. B. Y. Carmichael, 23. G. B. Welch, 24. T. W. Martin, 25. W. P. Newman, 26. Miss Toccoa Cozart, 27. S. Gassenheimer, 28. Mrs. Minnie Reese Richardson, 29. Dr. T. Gardner Foster, 30. Mrs. F. C. Stevenson, 31. J. D. Blocker, 32. J. Henry Foster, 33. W. M. Craven, 34. H. H. Cheatham, 35. M. E. Vickers, 36. S. G. Kimbrough, 37. R. H. McKay, 38. P. B. Hudgens, 39. A. M. Kennedy, 40. H. F. Schuler, 41. J. M. Wright, 42. O. C. Cone, 43. O. K. Seyforth, 44. J. M. Garrett, 45. J. T. Alley, 46. R. K. Jefferies, 47. E. W. Robinson, 48. A. S. Coleman, 49. A. Sidney Coleman, Jr., 50. Vivian Garrett.

Saffold Joseph standing directly behind H. F. Schuler, No. 40, but only his hair is showing.

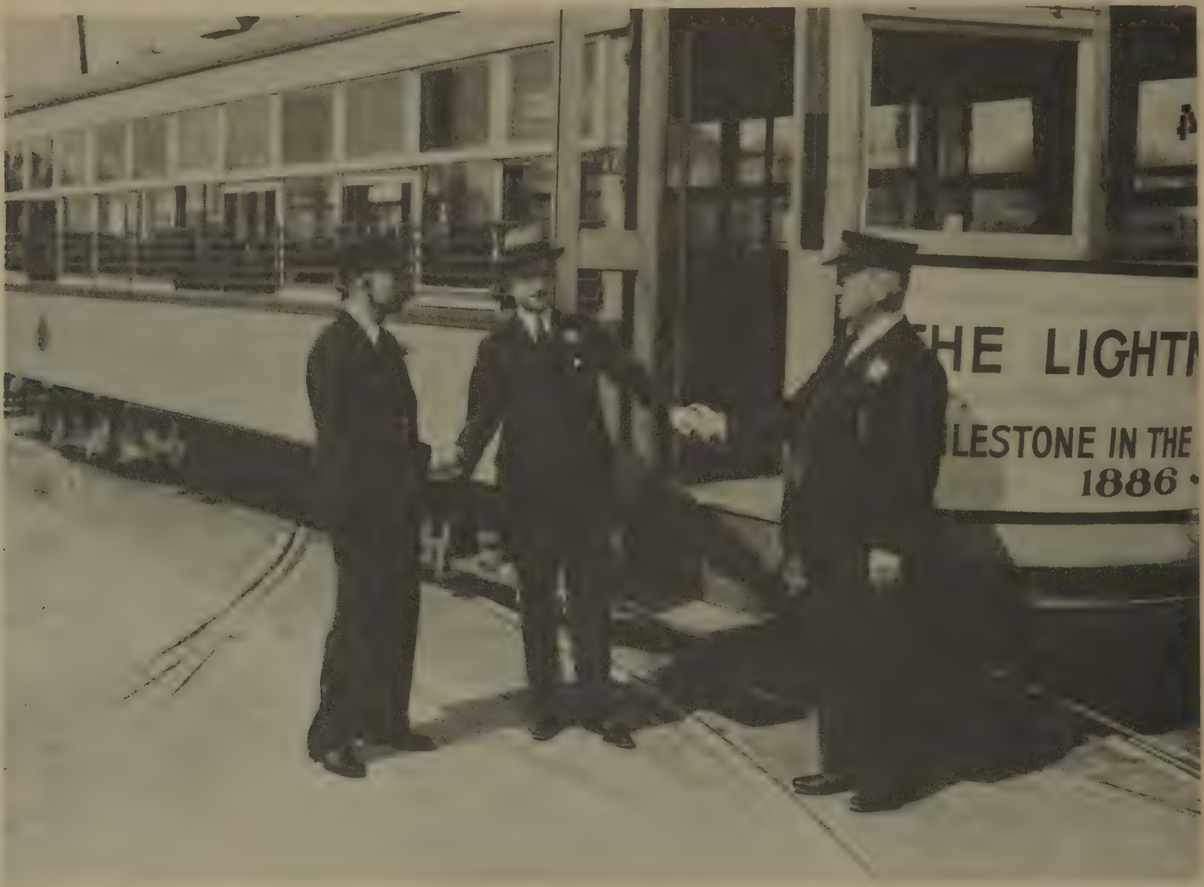
and employees of Alabama Power Company, and especially invited guests. A cheer arose from the crowd when the cars moved from the Square to Montgomery and Lee Streets, and thence along Court Street to Grove Street for the final run southward from the center of the city. Except for the first two blocks, the cars followed the route used about half a century ago by the world's first electric railway.

"The cars stopped at Grove Street—the end of the original line—the seats were shifted, and they returned to Court Square and thence to the car barn on Madison Avenue. As the street cars moved through the streets it was an odd sight to see groups of persons standing on the sidewalks, many of them waving or clapping their hands. Inside the cars, some of the old-timers seemed to find it difficult to suppress a tear.

Approximately 2,500 persons assembled at Court Square and along the route taken by the last electric street car to run in Montgomery.

"Everywhere along the route cameras and movie machines, of the home type, clicked. Several stores reported the biggest 'run' on films since the heavy snowfall during the Christmas holidays.

"At the car barn the passengers alighted and many pictures were taken of the cars, themselves. When this was done, the guests were returned to the city in two of the new motor buses. . ."



Thomas W. Martin, President of Alabama Power Company, in friendly farewell to D. B. Owen (right) and W. C. Wates (left), operators on the final run of electric street cars in Montgomery.

3/9/2009
160414 1 96 00
HF GROUP–IN